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**PICKERING NGS 'A', UNIT 1,
PRIMARY HEAT TRANSPORT PUMPSET
RECOMMISSIONING**

Report No 88-156-K

**J.J. Liska and P. Hoogendam
Engineer Technologist
Plant Equipment Dynamics Section
Mechanical Research Department**

ABSTRACT

This report describes the vibration re-commissioning results for the Pickering NGS 'A', Unit 1, Primary Heat Transport Pumpsets. Peak vibration velocities and frequency spectra are presented for each pumpset. The results are compared to General Machinery Vibration standards and experience.

job	740627-275-552	file	825.42	date	January 3, 1989	report no.	88-156-K
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EXECUTIVE SUMMARY

PICKERING NGS 'A', UNIT 1, PRIMARY HEAT TRANSPORT PUMPSET RECOMMISSIONING

Report No 88-156-K

J.J. Liska and P. Hoogendam
Engineer Technologist
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The Primary Heat Transport circulating, pressurizing and shut-down cooling pumpsets at Pickering NGS 'A', Unit 1 were re-commissioned. Baseline vibration levels and frequency spectra were collected at several locations on each of the 22 pumpsets. The overall vibration velocities, unfiltered and filtered at running speed, were measured and compared to General Machinery Vibration Standards and experience.

All 16 PHT circulating pumpsets have acceptable vibration levels. Many of the vibration frequency spectra show a large impeller blade pass frequency component. But, this is a result of the abnormal operating conditions under which the pumpsets were tested.

The 2 PHT pressurizing pumpsets have 'slightly rough' vibration characteristics under the operating conditions tested. But, in comparison to the pumpsets' history, the vibration levels are acceptable.

All 4 PHT shut down cooling pumpsets have acceptable vibration levels.

Vibration monitoring of these pumpsets is recommended since they are approaching the age when mechanical problems could start occurring more frequently. A continuous or periodic vibration monitoring system should be implemented.



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To

Mr. D. Howchin
Pickering NGS 'A'

**PICKERING NGS 'A', UNIT 1, PRIMARY HEAT
TRANSPORT PUMPSET RECOMMISSIONING**

1.0 INTRODUCTION

As requested by Pickering Operations, assistance was given to station personnel during May and June of 1987 in the re-commissioning of the Primary Heat Transport Pressuring, Circulating and Shut Down Cooling pumpsets. The objectives were:

1. To evaluate the acceptability of the pumpset vibrations with respect to specifications and/or industry standards.
2. To make recommendations for reducing pumpset vibration levels if they exceed standards.
3. To obtain baseline overall vibration levels and signatures for each pumpset and document the results in a commissioning report.

2.0. INSTRUMENTATION, MEASUREMENTS AND TEST CONDITIONS

2.1 Instrumentation

The vibration monitoring system installed at Pickering NGS 'A' in the 1970's has deteriorated to an inoperable condition. Many transducers are either missing or unreliable and the cabling inside containment has been removed. OHR report #82-211-H summarizes the status of the system.

It was necessary to install temporary instrumentation to monitor the pumpset vibrations. A portable, triaxial accelerometer arrangement mounted on a magnet was used to do the vibration surveys. The good cabling left in containment was used to transmit the transducer signals to the vibration monitoring room. The instrumentation setup used is shown in Figure 1.

A Bruel & Kjaer portable vibration calibrator, Model 4294, was used to check the continuity of the transducer cabling from inside containment to the vibration room. Also, an end-to-end instrumentation calibration was performed to compensate for any signal losses caused by the very long cable lengths.

2.2 Measurements

Vibration levels and spectra were measured on each vertical pumpset (PHT pressurizing and circulating) at the top of the motor and below the motor pedestal, just above the pump, as shown in Figures 2 and 3. The transducers were oriented radially and tangentially, in a horizontal plane perpendicular to the pumpset axis, and vertically.

Vibration measurements on the horizontal shut down cooling pumpsets were taken on the outboard and inboard motor and pump bearings, as shown in Figure 4. The transducers were oriented in three orthogonal directions.

2.2.1. Overall Vibration Levels

The overall velocity levels were determined from integrated accelerometer (Bruel & Kjaer Model 4370) signals and analyzed with a Bently Nevada Digital Vector Filter (DFV III). The results are presented as unfiltered, overall velocity (0-p) and 1xRPM narrow-band filtered velocity (0-p).

2.2.2. Vibration Spectra

The velocity spectra were determined from integrated accelerometer signals and analyzed with an Ono Sokki FFT Real Time Analyzer. The results presented are peak velocity (0-p) at each frequency based on 32 signal averages.

2.3 Test Conditions

All pumpsets were operated under cold conditions.

The two PHT pressurizing and four shut down cooling pumpsets were run one at a time. The shut down cooling pumps were operated in the recirculation mode.

Two PHT circulating pumpsets per quadrant were run simultaneously to insure balanced flow conditions. When a vibration survey of a pumpset was completed, that pumpset was shutdown and another in the quadrant started. All sixteen pumps were surveyed under the same temperature, pressure and flow conditions. The test pressure was less than 20% of design and the flow was partly recirculated.

3.0 RESULTS

3.1 Overall Vibration Levels

The unfiltered, overall vibration velocity levels measured on each pumpset are given in Table 1.

With the exception of HT-7, HT-10, PP-1 and SC-1, all the pumpsets have peak vibration levels less than 10 mm/s. A level less than 10 mm/s is considered to be acceptable for the operating conditions tested. Experience has shown these vibration levels will decrease by about 50% when operating under normal, hot, full flow conditions.

The shut down cooling pumpset, SC-1, had a loose support on the outboard pump bearing which may explain the higher vibration.

The 1xRPM filtered, vibration velocity levels measured on each pumpset are shown in Table 2.

General machinery vibration standards consider filtered velocity levels less than 4 mm/s peak to be acceptable. Therefore, the 16 PHT circulating and 4 shut down cooling pumpsets all have acceptable vibration levels.

The PHT pressurizing pumpsets which have levels in the 4 - 8 mm/s range are 'slightly rough', but marginally acceptable. These vertical, multistage pumpsets generally have higher than normal vibration levels because of their very long flexible shafts. Under normal operating conditions, experience has shown these vibration levels should decrease about 20%.

3.2. Vibration Spectra

The velocity spectra measured on the PHT circulating pumpsets are shown in Appendix A, Figures A-1 to A-96. The frequency components that predominate are:

- 13.7 Hz - structural natural frequency
- 30 Hz - 1xRPM running speed
- 60 Hz - 2xRPM and some electrical interference
- 150 Hz - 5xRPM impeller blade pass frequency
- 300 Hz - 10xRPM harmonic of impeller blade pass frequency

The 60 Hz spectral component is partly vibration related (a harmonic of running speed) and partly electrical interference due to the long cable lengths.

The impeller blade pass frequency component and its harmonics result from the abnormal flow conditions under which the pumpsets were tested. During normal operation, these components are significantly reduced.

The velocity spectra measured on the PHT pressurizing pumpsets are shown in Appendix B, Figures B-1 to B-12. The 60 Hz frequency component predominates. In some spectra, the blade pass frequency (300 Hz) shows up.

The velocity spectra measured on the Shut Down Cooling pumpsets are shown in Appendix C, Figures C-1 to C-36. These vibrations are dominated by several structural modes with frequencies less than 40 Hz. The amplitude of the running speed components and harmonics are very low. Again, the 60Hz component observed is partly vibration and electrical noise.

4.0 CONCLUSIONS

4.1 The PHT circulating and shutdown cooling pumpsets have acceptable vibration levels when compared to levels experienced with similar pumpsets and General Machinery Vibration Standards.

4.2 The PHT pressurizing pumpsets are 'slightly rough' in comparison to vibration standards, but pumpset vibration history has shown the levels measured to be acceptable.

5.0 RECOMMENDATIONS

5.1 Upgrading the vibration monitoring system to a condition where it can be used on a periodic basis to monitor the vibration of these pumpsets, without entering containment, would be beneficial. As the pumpsets age, mechanical problems could be occurring more frequently than they have in the past.

5.2 If upgrading the present system is too costly, a vibration monitoring and diagnostics program based on periodic surveys with portable vibration equipment should be implemented.

There have been significant advances in vibration monitoring and predictive maintenance in the past few years. Mechanical Research can provide information on costs and benefits, staff training, assistance and consultation in these areas.

ACKNOWLEDGMENTS

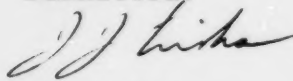
The cooperation and assistance of the Pickering NGS 'A' maintenance and technical staff is much appreciated.

Approved:

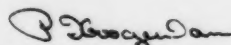


G.J. Clarke
Manager
Mechanical Research Dept

Submitted:

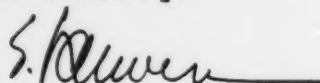


J.J. Liska
Engineer
Plant Equipment Dynamics Section



P. Hoogendam
Technologist
Plant Equipment Dynamics Section

Reviewed by:



T. Loewen
Supervising Engineer
Plant Equipment Dynamics Section
Mechanical Research Department

REFERENCES

1. R.B. Jay, "Pickering NGS 'A' - Serviceability and Status of Pumpset Vibration Monitoring System (PVMS)", Ontario Hydro Research Division Report No 82-211-H, June 7, 1982.

Table 1. Unfiltered, Peak Vibration Levels

Pickering NGS A Unit 1 Pumpset Vibration

Unfiltered, Overall Peak Vibration Velocities (mm/s p)

PHT CIRCULATING PUMPS : 1800 RPM

PUMP	Top Of Motor			Pump Bowl		
	Vert	N-S	E-W	Vert	N-S	E-W
HT-1	4.4	4.8	5.9	4.9	5.3	6.7
HT-2	5.1	5.1	4.5	5.0	4.4	3.4
HT-3	4.8	5.0	3.8	4.8	5.7	3.5
HT-4	5.7	6.7	4.1	3.7	6.5	4.1
HT-5	3.9	5.1	4.4	3.7	5.5	4.1
HT-6	5.1	4.9	3.9	5.1	6.3	3.2
HT-7	10.0	5.0	4.5	5.5	4.6	3.6
HT-8	4.3	7.1	5.8	4.2	6.3	5.2
HT-9	6.9	6.4	5.2	4.9	6.9	4.6
HT-10	13.0	7.3	4.3	6.3	6.0	3.1
HT-11	5.2	4.7	5.2	8.1	7.6	4.3
HT-12	5.7	7.1	5.1	3.9	6.6	4.8
HT-13	3.5	5.5	4.1	4.5	7.6	3.9
HT-14	9.1	6.2	4.2	5.0	5.3	3.8
HT-15	4.5	5.2	3.7	4.1	7.2	3.5
HT-16	5.1	6.4	5.8	4.6	6.8	3.5

PHT PRESSURIZING PUMPS : 3600 RPM

PUMP	Top Of Motor			Bottom Of Motor		
	Vert	N-S	E-W	Vert	N-S	E-W
PP-1	7.9	7.5	10.0	2.5	5.0	3.0
PP-2	3.6	6.3	7.6	2.3	5.2	3.1

SHUT DOWN COOLING PUMPS : 1200 RPM

PUMP	Pump Outboard			Pump Inboard			Motor Outboard		
	Vert	N-S	E-W	Vert	N-S	E-W	Vert	N-S	E-W
SC-1	11.8	10.3	4.8	4.1	3.3	4.3	5.1	6.0	7.5
SC-2	4.1	5.3	3.7	5.0	5.4	4.2	5.5	6.5	6.3
SC-3	8.3	4.1	4.7	4.7	3.9	4.3	9.0	7.2	8.0
SC-4	6.0	5.5	2.9	6.2	3.1	3.1	5.3	5.9	8.3

Table 2. Filtered Peak Vibration Levels

Pickering NGS A Unit 1 Pumpset Vibration

Peak Vibration Velocities Filtered at 1xRPM (mm/s p)

PHT CIRCULATING PUMPS : 1800 RPM, 1xRPM = 30 Hz

PUMP	Top Of Motor			Pump Bowl		
	Vert	N-S	E-W	Vert	N-S	E-W
HT-1	0.1	0.4	0.4	0.2	0.5	0.2
HT-2	0.9	1.9	1.5	0.2	0.9	1.7
HT-3	0.3	1.8	0.7	0.2	0.7	0.5
HT-4	0.6	0.9	0.8	0.2	0.5	0.8
HT-5	0.3	0.6	0.7	0.2	0.7	0.7
HT-6	0.2	0.7	0.8	0.2	0.8	0.8
HT-7	0.4	0.4	0.9	0.2	0.4	0.9
HT-8	0.5	1.7	1.2	0.1	1.0	1.2
HT-9	0.5	0.8	1.3	0.3	1.4	1.0
HT-10	0.2	1.3	0.6	0.3	0.7	0.8
HT-11	0.9	0.5	1.4	0.2	1.6	1.5
HT-12	0.3	1.9	2.3	0.4	1.0	0.8
HT-13	0.2	1.2	0.6	0.2	0.9	1.0
HT-14	0.7	1.5	1.2	0.3	0.4	1.4
HT-15	0.2	1.3	0.7	0.2	1.0	1.0
HT-16	0.9	0.7	1.2	0.2	0.8	0.8

PHT PRESSURIZING PUMPS : 3600 RPM, 1xRPM = 60 Hz

PUMP	Top Of Motor			Bottom Of Motor		
	Vert	N-S	E-W	Vert	N-S	E-W
PP-1	2.0	3.4	4.0	0.7	5.1	1.4
PP-2	0.8	5.9	4.2	0.7	2.7	1.6

SHUT DOWN COOLING PUMPS : 1200 RPM, 1xRPM = 20 Hz

PUMP	Pump Outboard			Pump Inboard			Motor Outboard		
	Vert	N-S	E-W	Vert	N-S	E-W	Vert	N-S	E-W
SC-1	0.3	0.4	0.2	0.2	0.3	0.3	0.3	0.5	0.7
SC-2	0.4	0.5	0.2	0.3	0.5	0.2	0.4	0.5	0.5
SC-3	0.9	0.7	0.2	0.7	0.3	0.4	0.9	0.5	1.1
SC-4	0.6	0.6	0.4	0.3	0.2	0.4	0.9	0.9	1.0

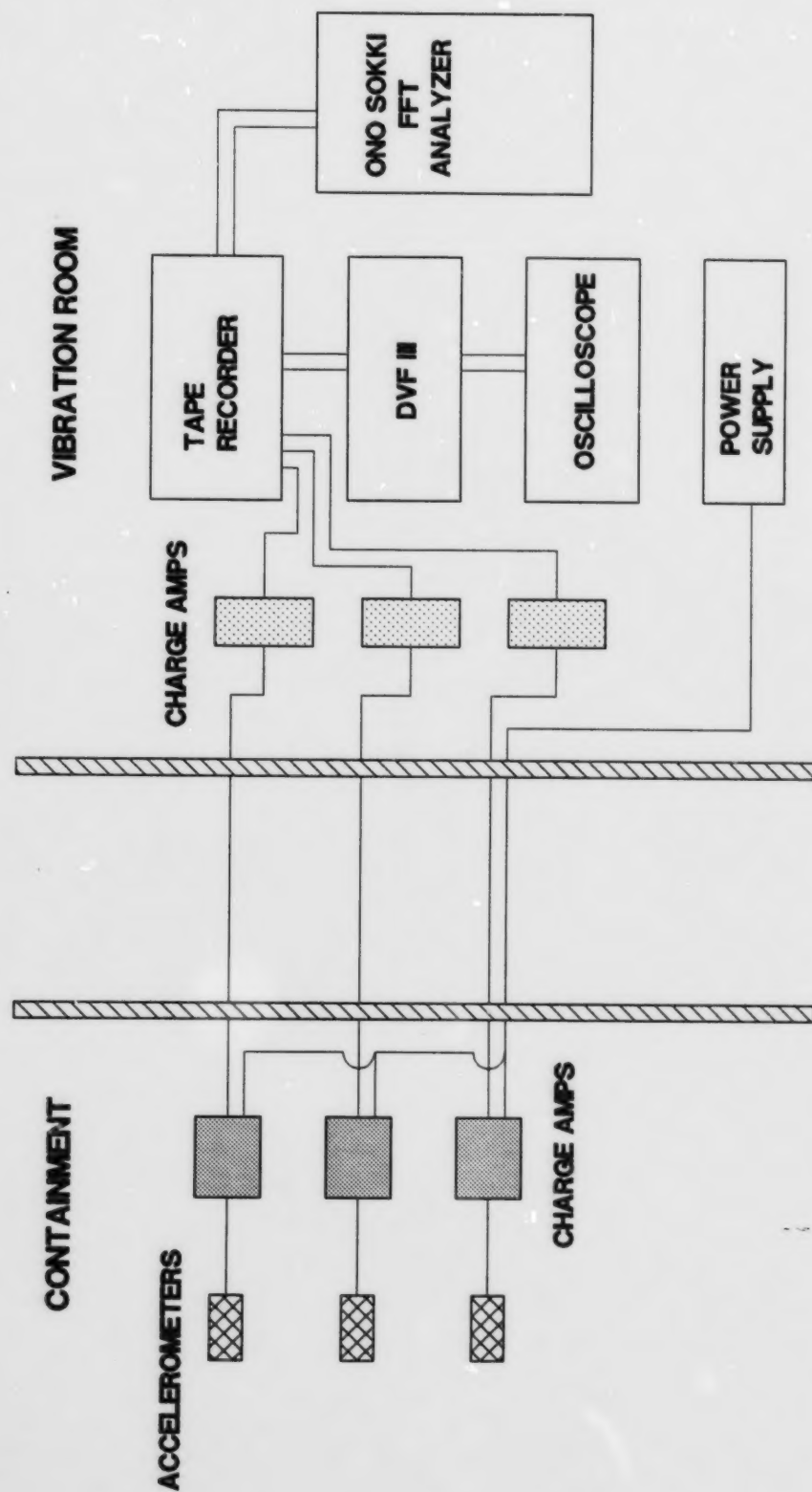


FIGURE 1 INSTRUMENTATION LAYOUT

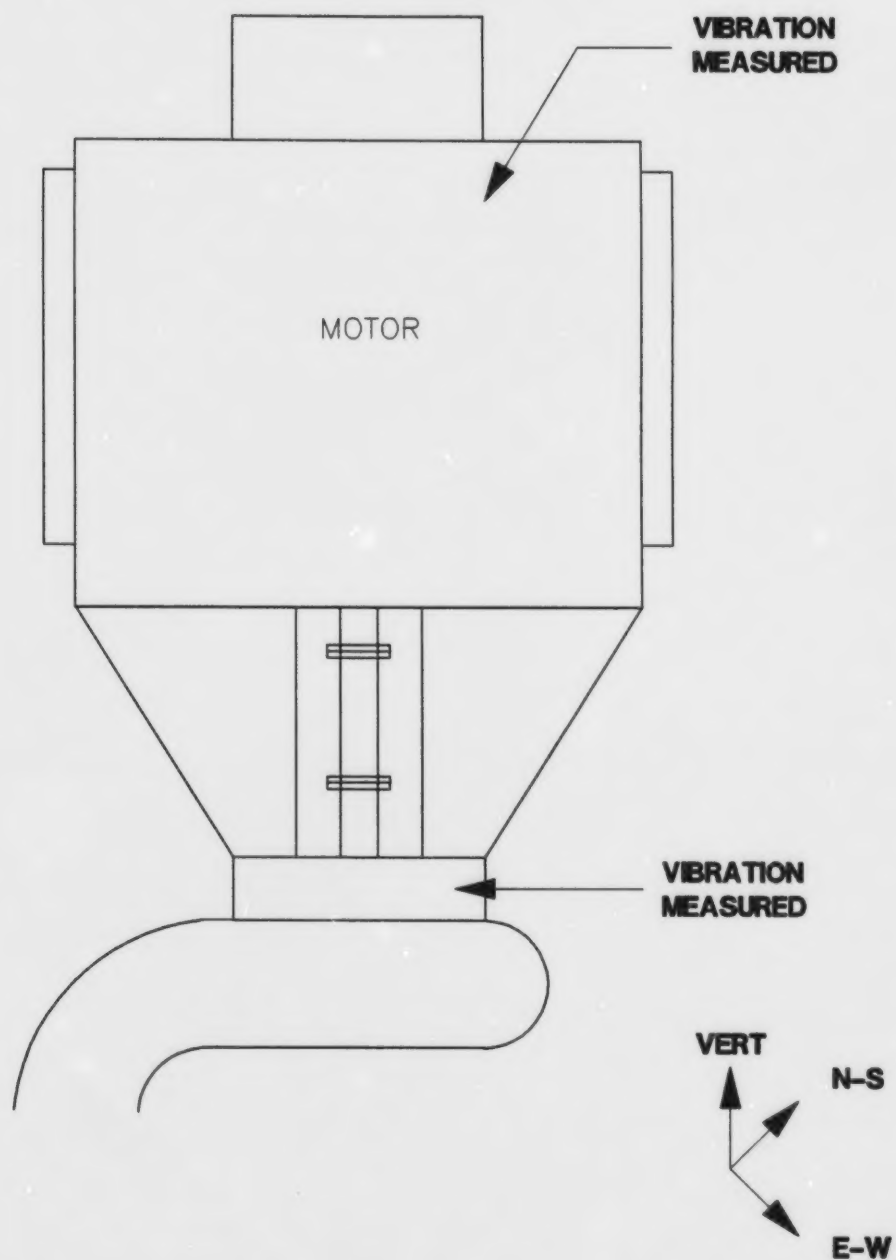


FIGURE 2 LOCATION OF PHT CIRCULATING PUMPSET MEASUREMENTS

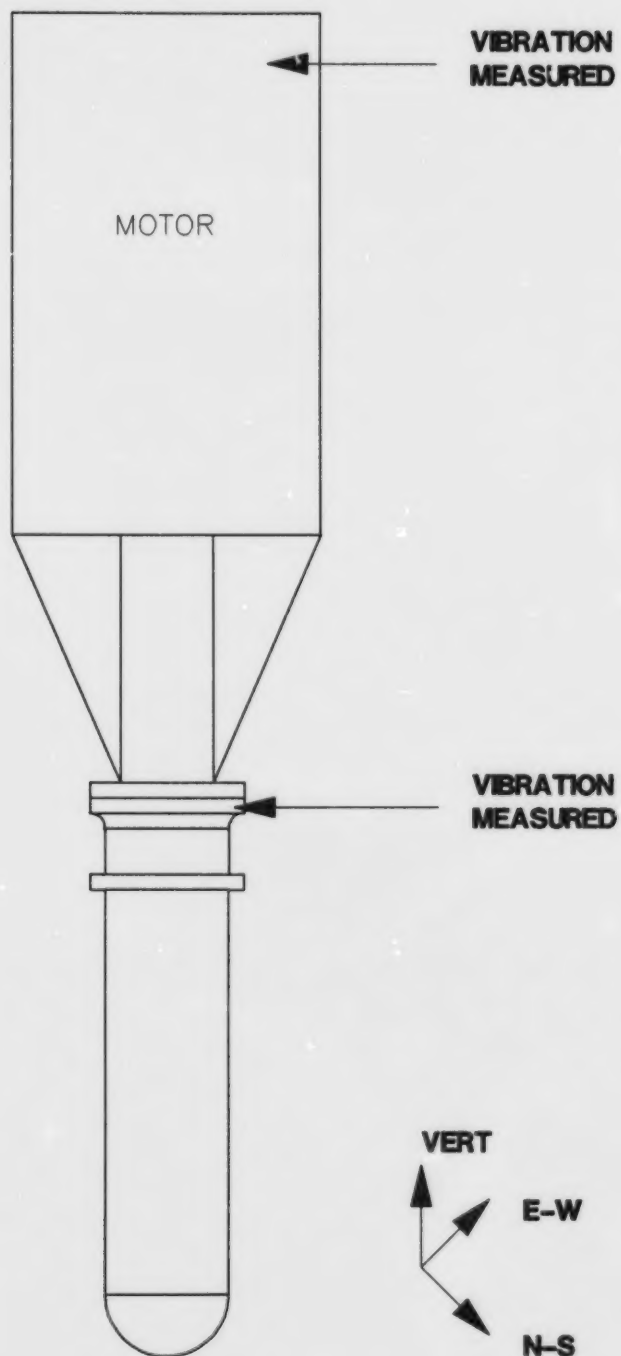


FIGURE 3 LOCATION OF PHT PRESSURIZING PUMPSET MEASUREMENTS

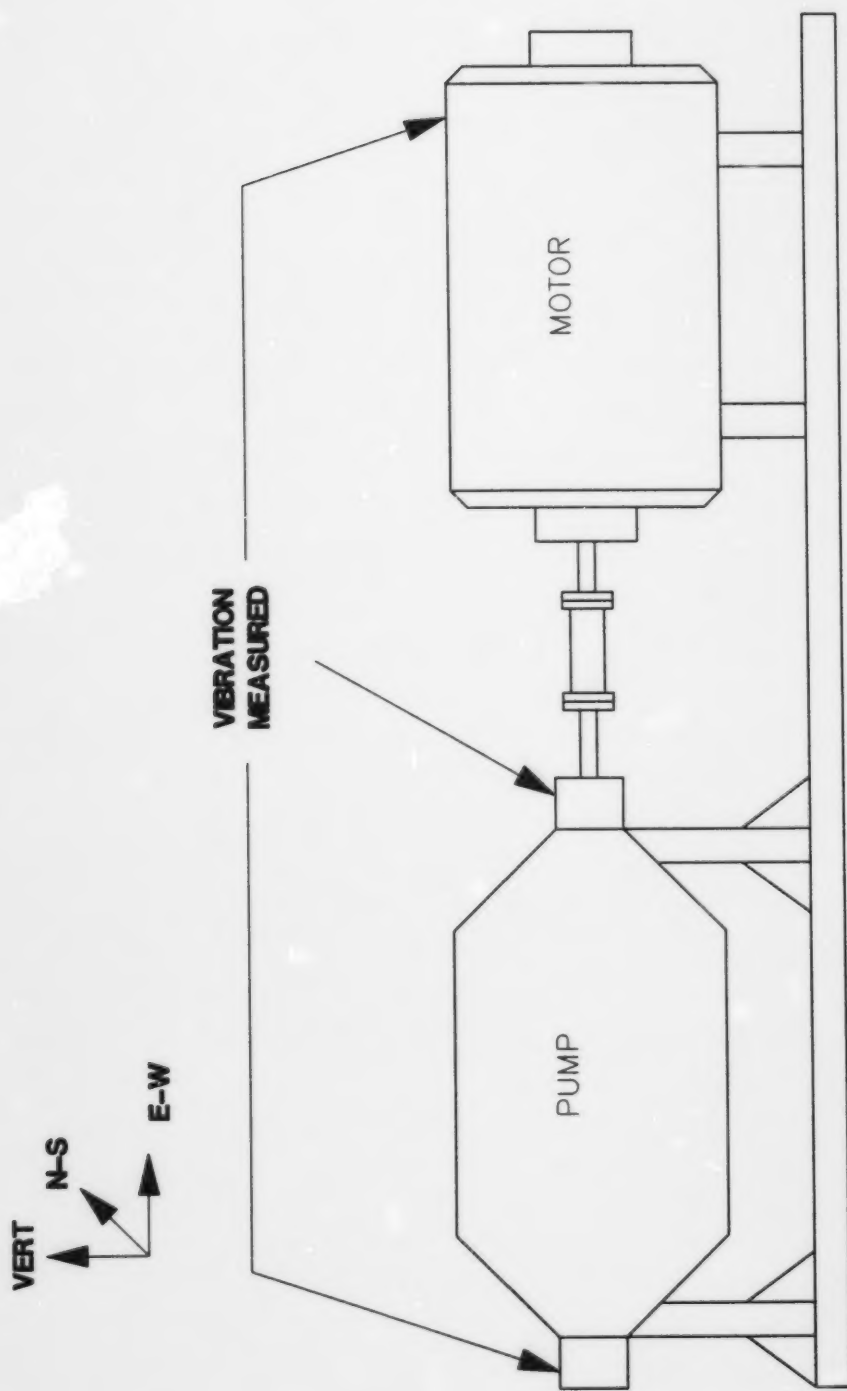


FIGURE 4 LOCATION OF SHUT DOWN COOLING PUMPSET MEASUREMENTS

Appendix A. PHT Circulating Pumpset Vibration Spectra

	PWR SPECTRUM	ChA	EU
1	150.00Hz		.972E+0
2	13.75		.704E+0
3	60.00		.651E+0
4	298.75		.520E+0
5	20.00		.237E+0
6	23.75		.234E+0
7	42.50		.169E+0
8	448.75		.176E+0
9	388.75		.163E+0
10	30.00		.138E+0



FIGURE A-1 : PUMPSET #1, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	
1	60.00Hz	.118E+1	EU
2	13.75	.943E+0	
3	150.00	.585E+0	
4	3.75	.544E+0	
5	30.00	.406E+0	
6	23.75	.245E+0	
7	46.25	.159E+0	
8	38.75	.131E+0	
9	120.00	.113E+0	
10	298.75	.109E+0	

TOP OF MOTOR > N-S

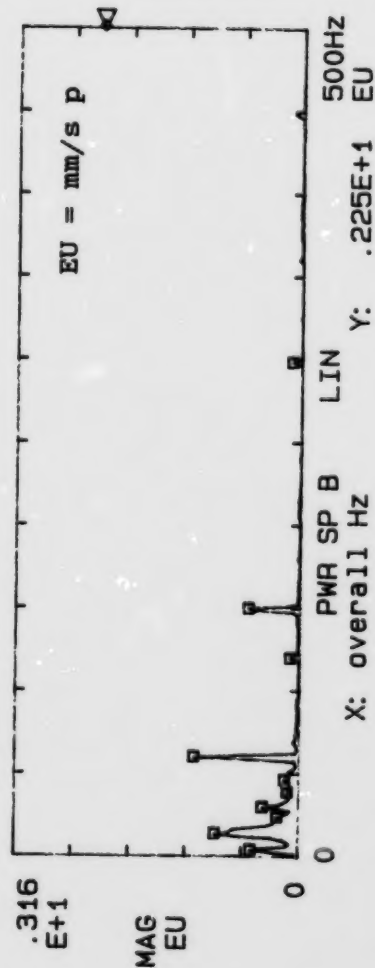


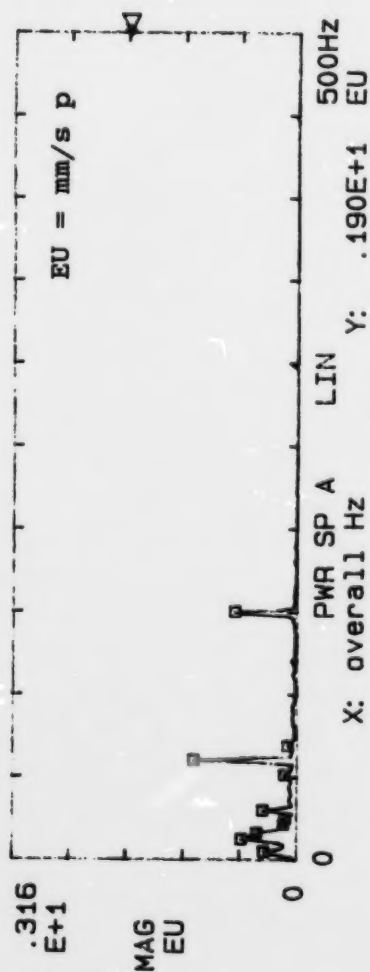
FIGURE A-2 : PUMPSET #1, VIBRATION SPECTRA AT TOP OF MOTOR

04: 30

PICKERING A U1 P.H.T. PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.116E+1	EU
2	150.00	.702E+0	
3	12.50	.622E+0	
4	16.25	.445E+0	
5	30.00	.383E+0	
6	5.00	.368E+0	
7	21.25	.151E+0	
8	51.25	.140E+0	
9	25.00	.134E+0	
10	68.75	.102E+0	

TOP OF MOTOR > E-W



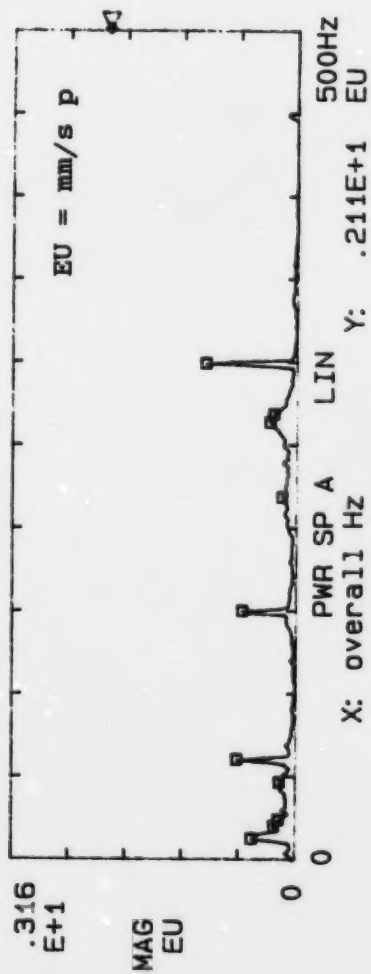
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FIGURE A-3 : PUMPSET #1, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #1 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	298.75Hz	.103E+1	EU
2	60.00	.662E+0	
3	150.00	.604E+0	
4	12.50	.493E+0	
5	263.75	.307E+0	
6	268.75	.259E+0	
7	20.00	.239E+0	
8	23.75	.190E+0	
9	46.25	.178E+0	
10	218.75	.160E+0	

ABOVE PUMP BOWL > VERTICAL



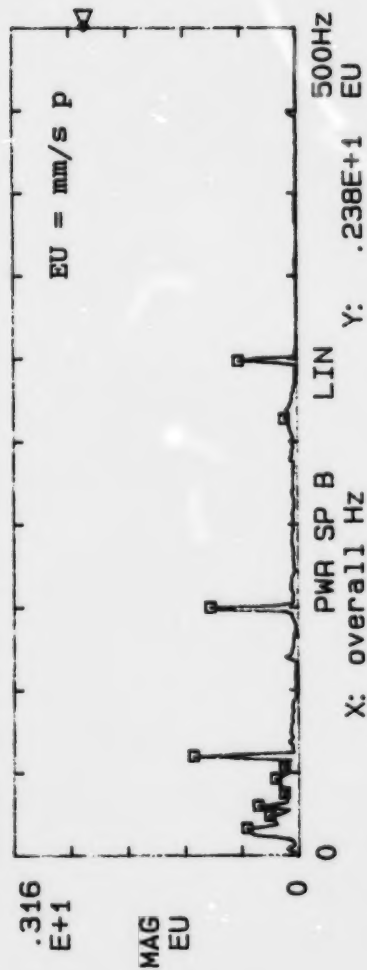
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FIGURE A-4 : PUMPSET #1, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	EU
1	60.00Hz	.119E+1	
2	150.00	.982E+0	
3	298.75	.664E+0	
4	16.25	.593E+0	
5	30.00	.455E+0	
6	23.75	.331E+0	
7	46.25	.260E+0	
8	37.50	.165E+0	
9	52.50	.160E+0	
10	263.75	.150E+0	

ABOVE PUMP BOWL > N-S



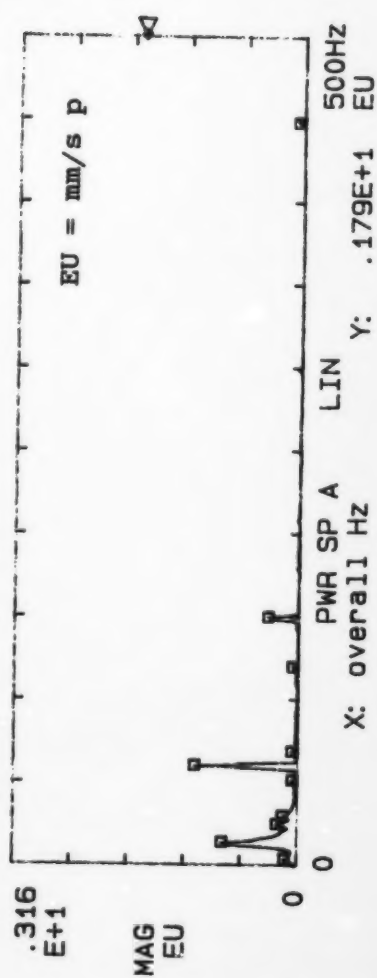
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FIGURE A-5 : PUMPSET #1, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.116E+1	EU
2	13.75	.848E+0	
3	150.00	.348E+0	
4	25.00	.237E+0	
5	30.00	.173E+0	
6	3.75	.145E+0	
7	68.75	.783E-1	
8	120.00	.764E-1	
9	448.75	.749E-1	
10	51.25	.614E-1	

ABOVE PUMP BOWL > E-W



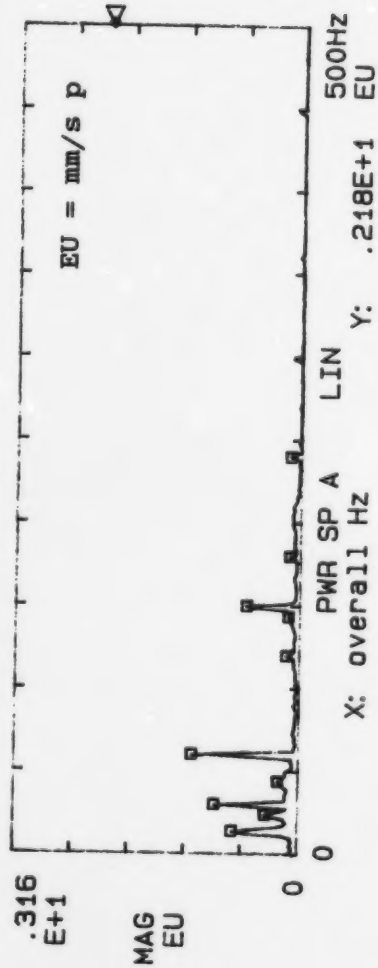
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FIGURE A-6 : PUMPSET #1, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.119E+1	EU
2	30.00	.932E+0	
3	13.75	.740E+0	
4	150.00	.600E+0	
5	23.75	.372E+0	
6	43.75	.230E+0	
7	120.00	.157E+0	
8	143.75	.130E+0	
9	180.00	.123E+0	
10	240.00	.120E+0	

TOP OF MOTOR > VERTICAL



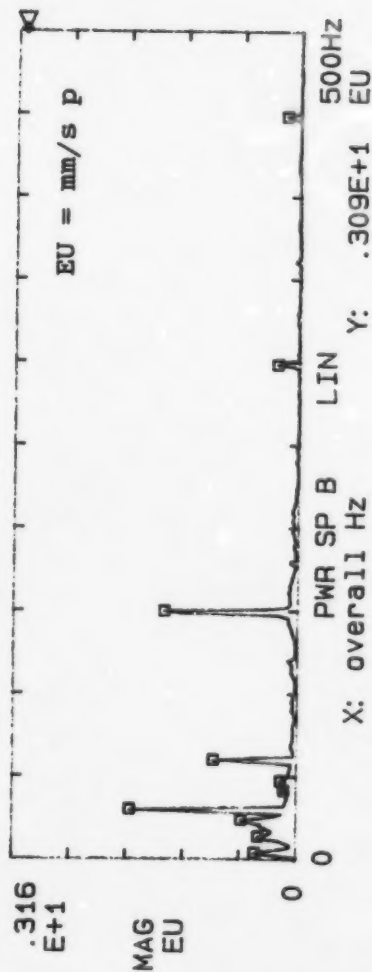
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FIGURE A-7 : PUMPSET #2, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	
1	30.00Hz	.186E+1	EU
2	150.00	.149E+1	
3	60.00	.938E+0	
4	23.75	.618E+0	
5	3.75	.472E+0	
6	13.75	.430E+0	
7	298.75	.256E+0	
8	47.50	.183E+0	
9	448.75	.162E+0	
10	41.25	.142E+0	

TOP OF MOTOR > N-S



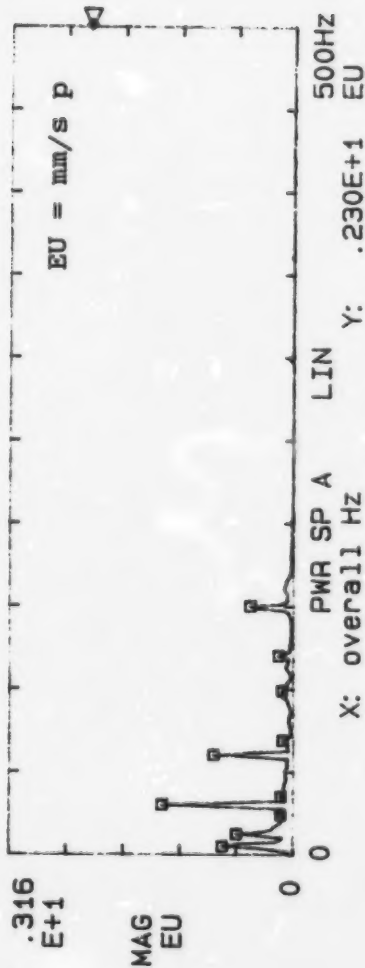
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FIGURE A-8 : PUMPSET #2, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	30.00Hz	.147E+1	EU
2	60.00	.891E+0	
3	5.00	.798E+0	
4	12.50	.633E+0	
5	150.00	.490E+0	
6	120.00	.171E+0	
7	23.75	.144E+0	
8	35.00	.139E+0	
9	98.75	.135E+0	
10	68.75	.126E+0	

TOP OF MOTOR > E-W



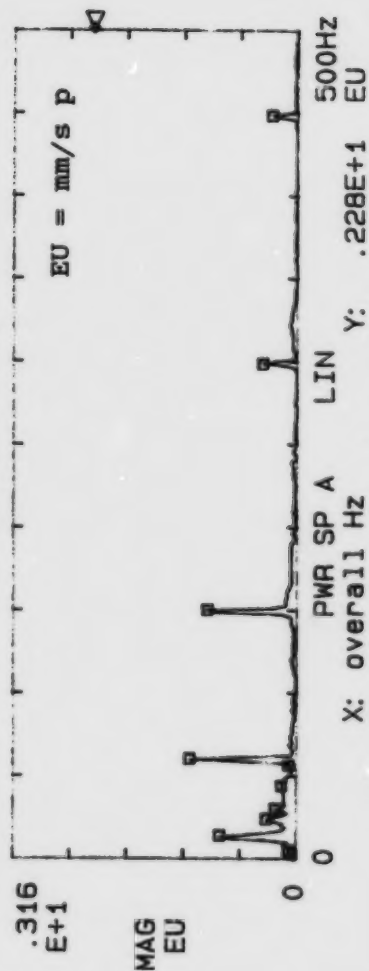
06:47

FIGURE A-9 : PUMPSET #2, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.120E+1	EU
2	150.00	.101E+1	
3	13.75	.870E+0	
4	298.75	.388E+0	
5	23.75	.342E+0	
6	448.75	.295E+0	
7	30.00	.246E+0	
8	43.75	.172E+0	
9	5.00	.911E-1	
10	56.25	.914E-1	

ABOVE PUMP BOWL > VERTICAL



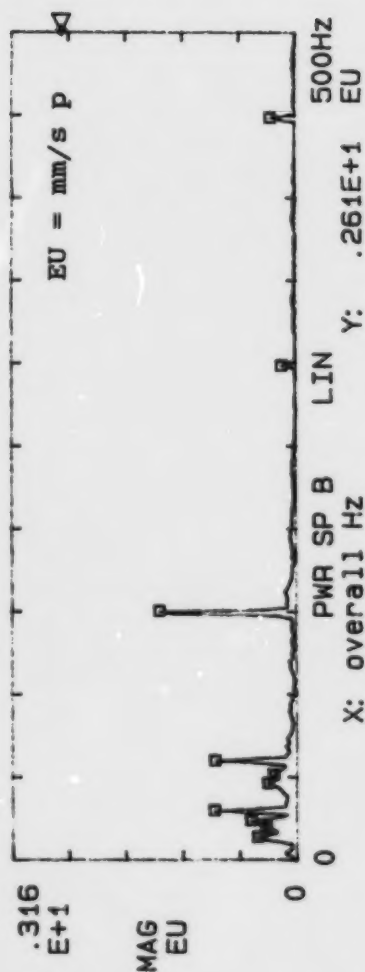
06:09

FIGURE A-10 : PUMPSET #2, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	EU
1	150.00Hz	.153E+1	EU
2	30.00	.926E+0	
3	60.00	.912E+0	
4	23.75	.517E+0	
5	13.75	.442E+0	
6	20.00	.351E+0	
7	46.25	.327E+0	
8	448.75	.278E+0	
9	51.25	.267E+0	
10	298.75	.163E+0	

ABOVE PUMP BOWL > N-S



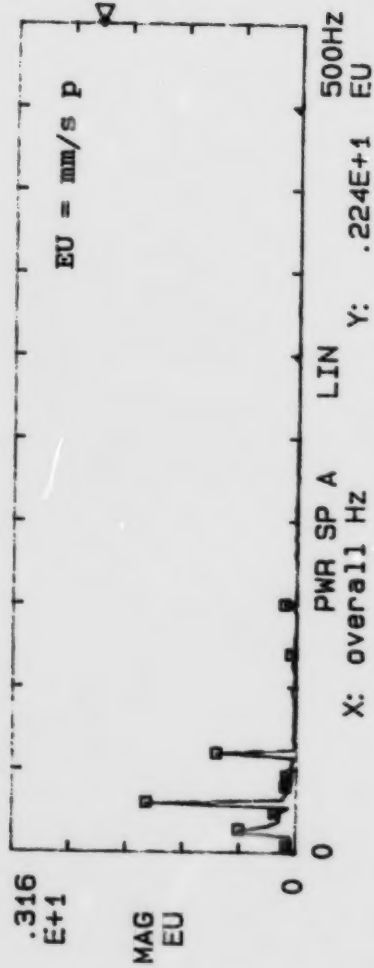
06: 10

FIGURE A-11 : PUMPSET #2, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	30.00Hz	.167E+1	EU
2	60.00	.894E+0	
3	13.75	.651E+0	
4	23.75	.239E+0	
5	150.00	.139E+0	
6	40.00	.122E+0	
7	3.75	.117E+0	
8	43.75	.112E+0	
9	46.25	.115E+0	
10	120.00	.752E-1	

ABOVE PUMP BOWL > E-W

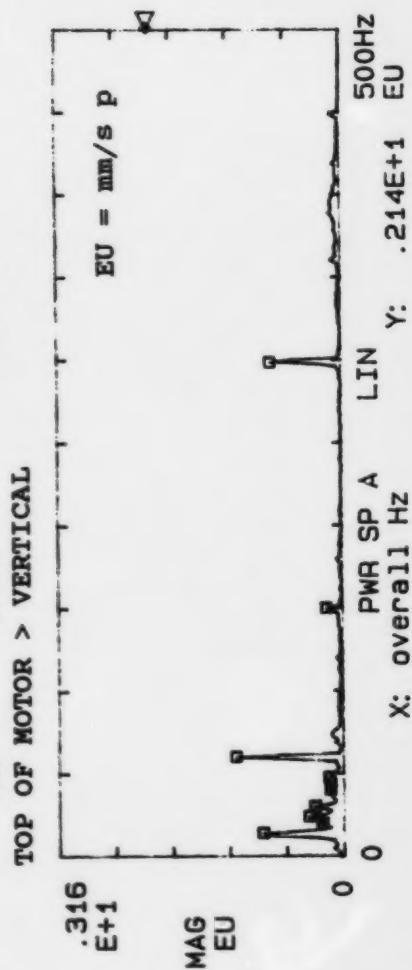


06:49

FIGURE A-12 : PUMPSET #2, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #3 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.120E+1	EU
2	13.75	.902E+0	
3	298.75	.804E+0	
4	23.75	.389E+0	
5	30.00	.323E+0	
6	20.00	.241E+0	
7	150.00	.181E+0	
8	47.50	.162E+0	
9	40.00	.151E+0	
10	43.75	.154E+0	



06: 12

FIGURE A-13 : PUMPSET #3, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #3 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	EU
1	30.00Hz	.184E+1	EU
2	60.00	.913E+0	
3	150.00	.889E+0	
4	23.75	.687E+0	
5	13.75	.589E+0	
6	3.75	.471E+0	
7	298.75	.293E+0	
8	120.00	.156E+0	
9	42.50	.149E+0	
10	47.50	.147E+0	

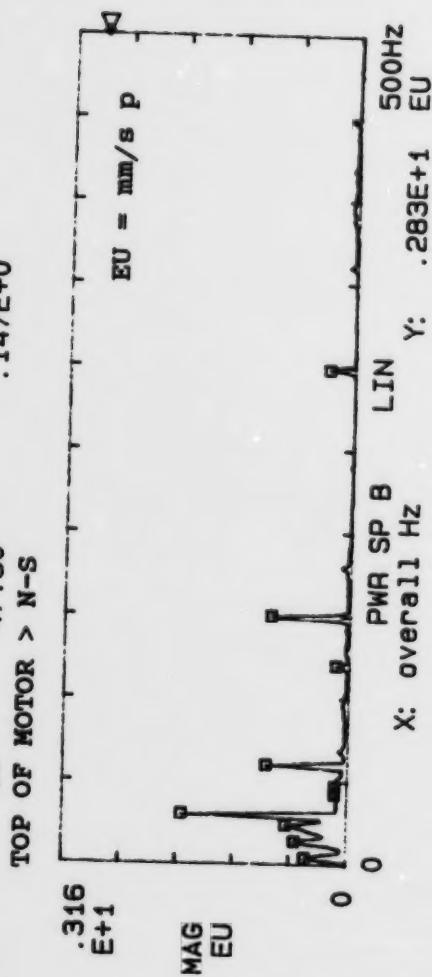
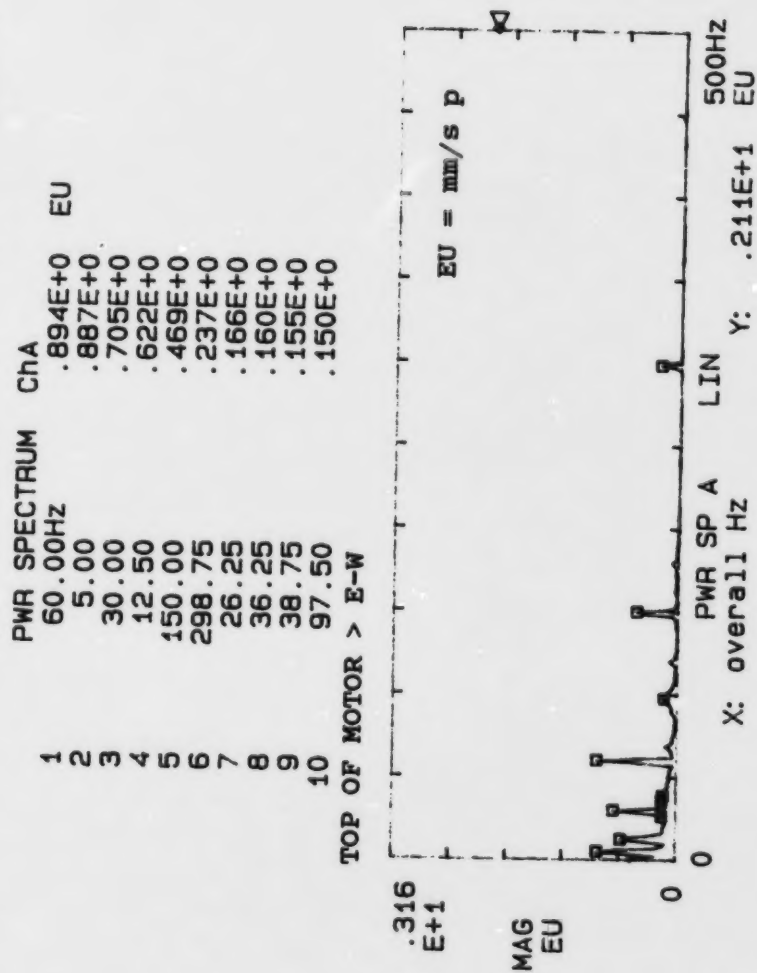


FIGURE A-14 : PUMPSET #3, VIBRATION SPECTRA AT TOP OF MOTOR

06: 13

PICKERING A U1 P.H.T. PUMPSET #3 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k



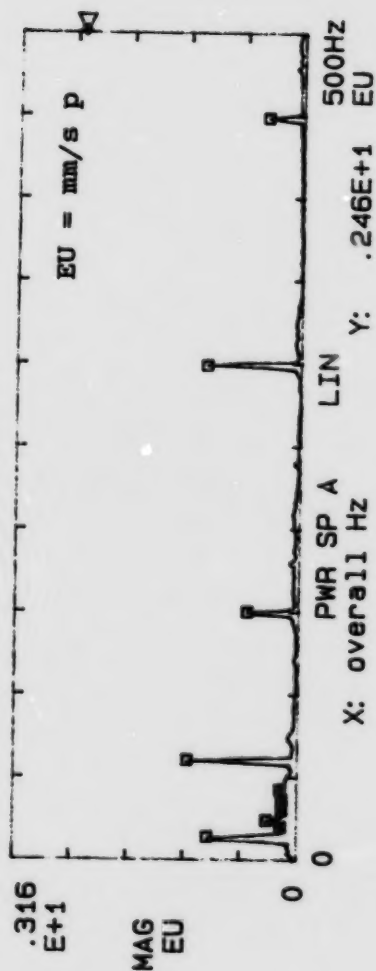
06:51

FIGURE A-15 : PUMPSET #3, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #3 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.123E+1	EU
2	298.75	.106E+1	
3	13.75	.100E+1	
4	150.00	.581E+0	
5	448.75	.401E+0	
6	23.75	.343E+0	
7	42.50	.192E+0	
8	20.00	.185E+0	
9	30.00	.174E+0	
10	36.25	.170E+0	

ABOVE PUMP B.C. L > VERTICAL



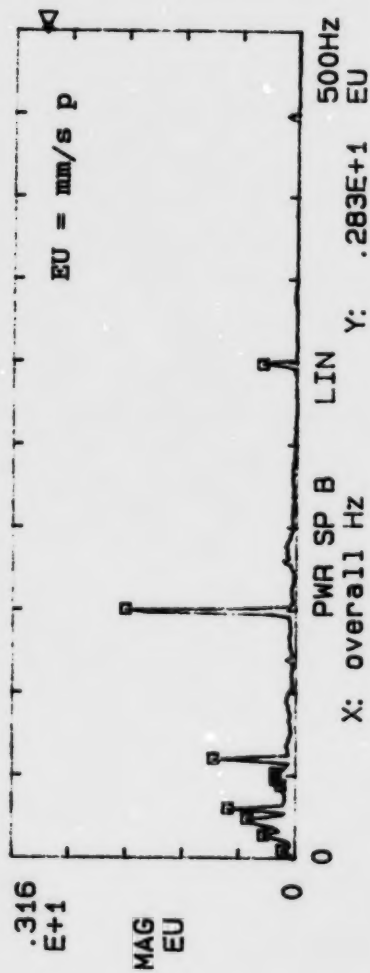
06: 15

FIGURE A-16 : PUMPSET #3, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #3 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB
1	150.00Hz	.191E+1 EU
2	60.00	.926E+0
3	30.00	.753E+0
4	23.75	.548E+0
5	298.75	.394E+0
6	13.75	.366E+0
7	47.50	.231E+0
8	51.25	.233E+0
9	43.75	.172E+0
10	5.00	.151E+0

ABOVE PUMP BOWL > N-S



06: 16

FIGURE A-17 : PUMPSET #3, VIBRATION SPECTRA ABOVE PUMP BOWL

	PWR SPECTRUM	Cha	EU
1	60.00Hz	.899E+0	
2	13.75	.873E+0	
3	30.00	.493E+0	
4	22.50	.225E+0	
5	3.75	.164E+0	
6	150.00	.137E+0	
7	42.50	.102E+0	
8	68.75	.814E-1	
9	98.75	.698E-1	
10	180.00	.552E-1	

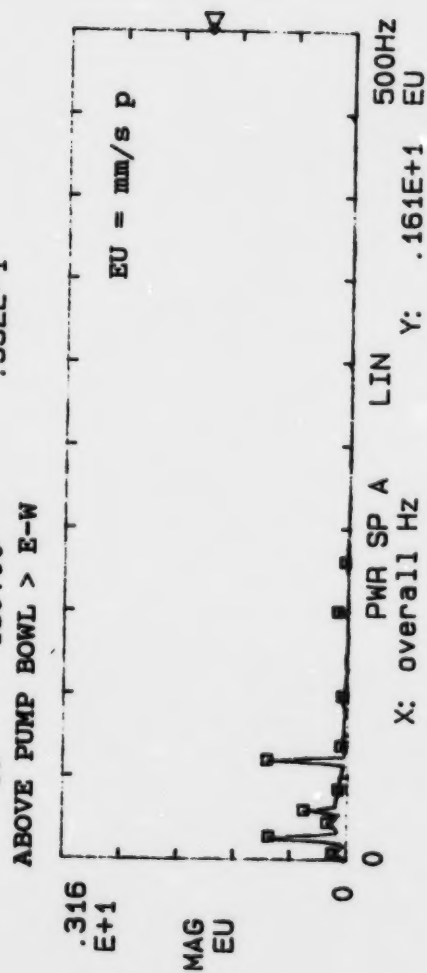


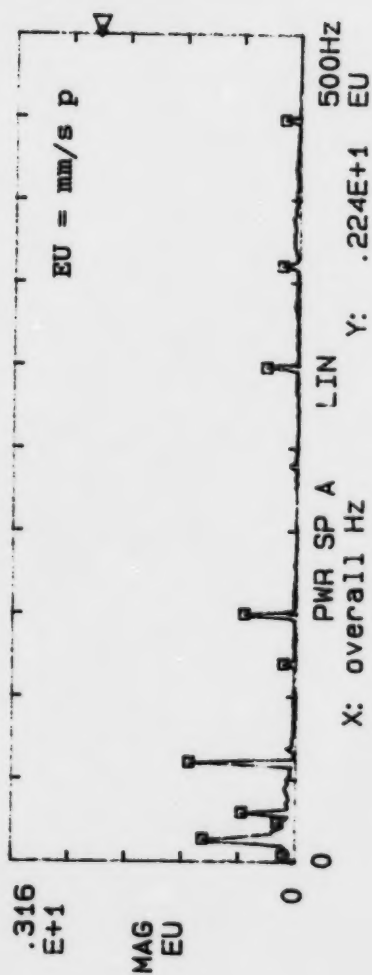
FIGURE A-18 : PUMPSET #3, VIBRATION SPECTRA ABOVE PUMP BOWL

06:53

PICKERING A U1 P.H.T. PUMPSET #4 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA
1	60.00Hz	.120E+1 EU
2	13.75	.104E+1
3	30.00	.612E+0
4	150.00	.594E+0
5	298.75	.359E+0
6	23.75	.206E+0
7	360.00	.194E+0
8	448.75	.170E+0
9	3.75	.142E+0
10	120.00	.146E+0

TOP OF MOTOR > VERTICAL



06: 19

FIGURE A-19 : PUMPSET #4, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #4 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB
1	150.00Hz	.150E+1 EU
2	13.75	.138E+1
3	60.00	.936E+0
4	30.00	.855E+0
5	3.75	.837E+0
6	43.75	.180E+0
7	35.00	.173E+0
8	360.00	.118E+0
9	68.75	.102E+0
10	448.75	.892E-1

TOP OF MOTOR > N-S

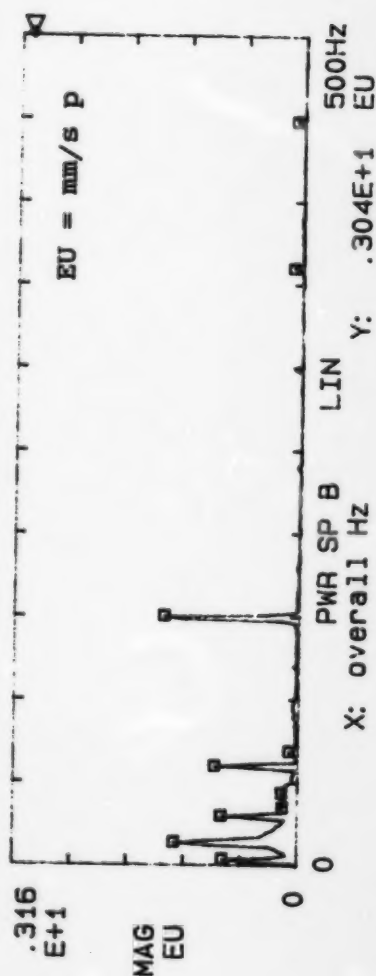


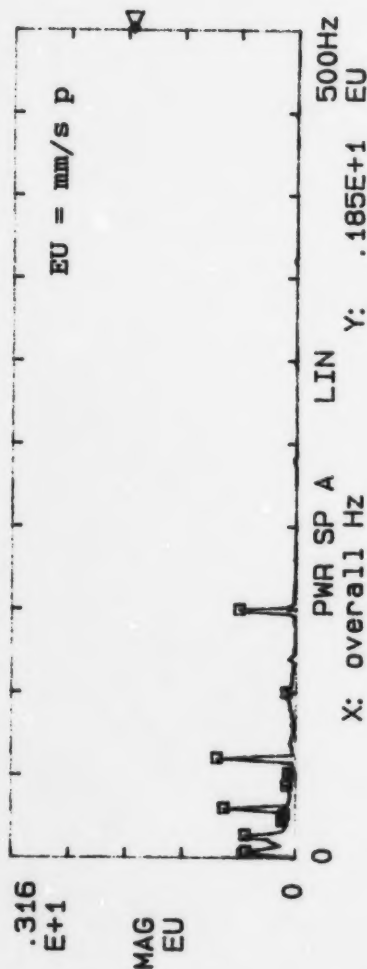
FIGURE A-20 : PUMPSET #4, VIBRATION SPECTRA AT TOP OF MOTOR

06:20

PICKERING A U1 P.H.T. PUMPSET #4 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.888E+0	EU
2	30.00	.807E+0	
3	150.00	.639E+0	
4	13.75	.572E+0	
5	3.75	.559E+0	
6	22.50	.150E+0	
7	26.25	.132E+0	
8	100.00	.113E+0	
9	43.75	.102E+0	
10	51.25	.793E-1	

TOP OF MOTOR > E-W



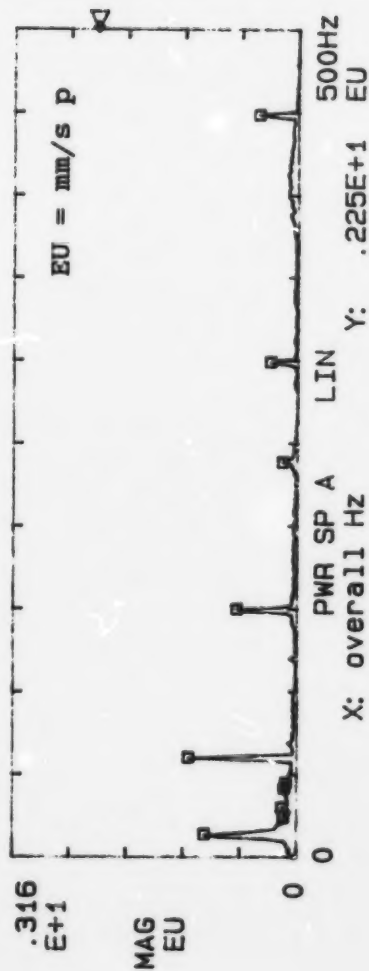
06:55

FIGURE A-21 : PUMPSET #4, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #4 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA
1	60.00Hz	.121E+1 EU
2	13.75	.103E+1
3	150.00	.682E+0
4	448.75	.442E+0
5	298.75	.309E+0
6	30.00	.178E+0
7	238.75	.174E+0
8	23.75	.158E+0
9	41.25	.144E+0
10	45.00	.120E+0

ABOVE PUMP BOWL > VERTICAL



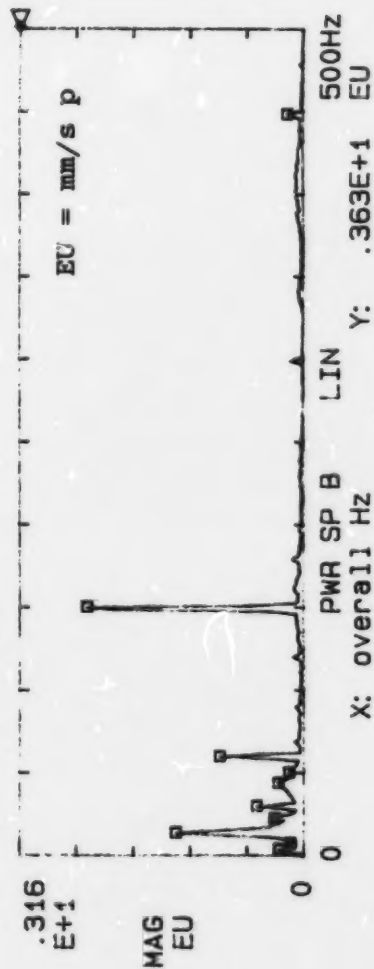
06: 22

FIGURE A-22 : PUMPSET #4, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #4 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB	
1	150.00Hz	.243E+1	EU
2	13.75	.143E+1	
3	60.00	.946E+0	
4	30.00	.529E+0	
5	22.50	.329E+0	
6	43.75	.294E+0	
7	3.75	.285E+0	
8	448.75	.186E+0	
9	50.00	.171E+0	
10	7.50	.149E+0	

ABOVE PUMP BOWL > N-S



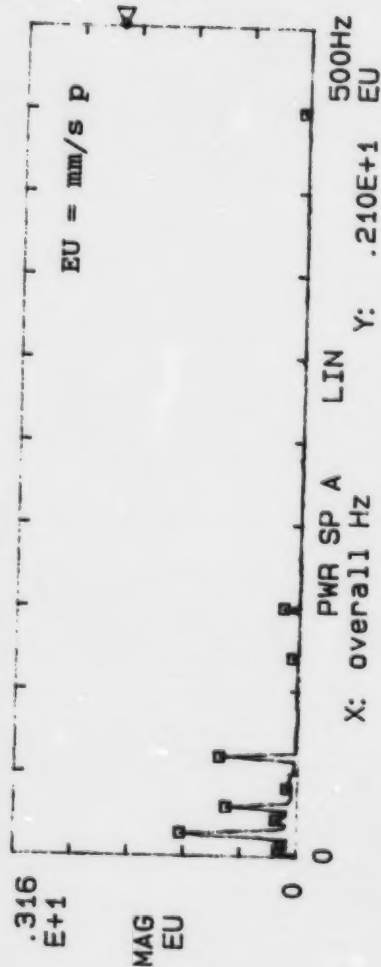
06:23

FIGURE A-23 : PUMPSET #4, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #4 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	13.75Hz	.131E+1	EU
2	60.00	.883E+0	
3	30.00	.810E+0	
4	22.50	.239E+0	
5	3.75	.212E+0	
6	150.00	.194E+0	
7	7.50	.173E+0	
8	41.25	.119E+0	
9	120.00	.853E-1	
10	448.75	.675E-1	

ABOVE PUMP BOWL > E-W



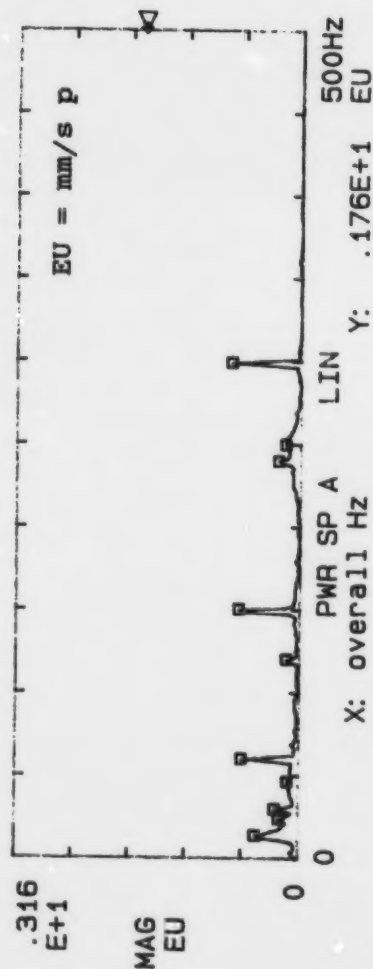
06: 58

FIGURE A-24 : PUMPSET #4, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #5 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	EU
1	298.75Hz	.779E+0	EU
2	150.00	.689E+0	
3	60.00	.650E+0	
4	13.75	.490E+0	
5	30.00	.275E+0	
6	240.00	.253E+0	
7	23.75	.222E+0	
8	250.00	.171E+0	
9	120.00	.158E+0	
10	46.25	.129E+0	

TOP OF MOTOR > VERTICAL



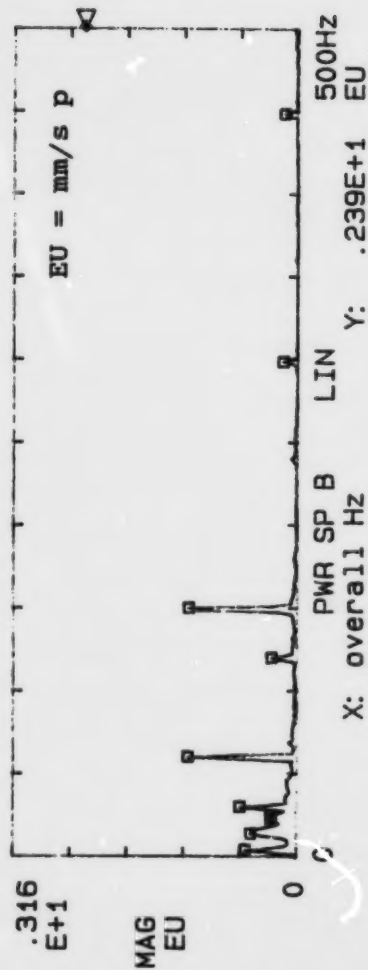
03:41

FIGURE A-25 : PUMPSET #5, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #5 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB
1	60.00Hz	.123E+1 EU
2	150.00	.121E+1
3	20.00	.633E+0
4	3.75	.581E+0
5	13.75	.522E+0
6	22.50	.293E+0
7	25.00	.288E+0
8	120.00	.291E+0
9	298.75	.163E+0
10	448.75	.153E+0

TOP OF MOTOR > N-S



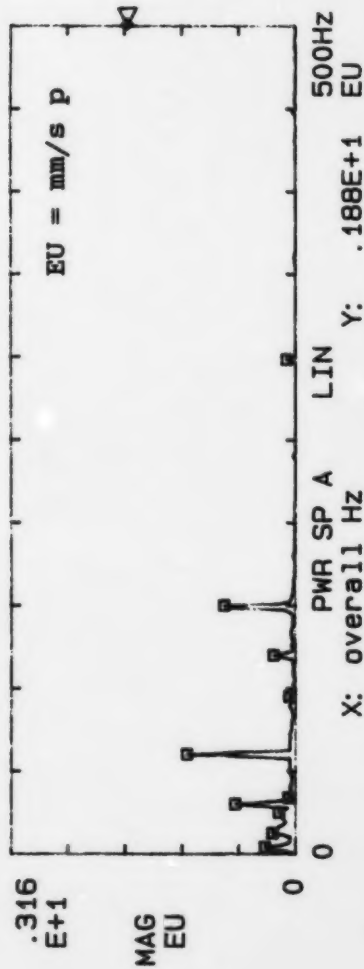
03:40

FIGURE A-26 : PUMPSET #5, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #5 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.122E+1	EU
2	150.00	.803E+0	
3	30.00	.681E+0	
4	3.75	.355E+0	
5	12.50	.260E+0	
6	120.00	.254E+0	
7	25.00	.193E+0	
8	298.75	.101E+0	
9	33.75	.817E-1	
10	95.00	.711E-1	

TOP OF MOTOR > E-W



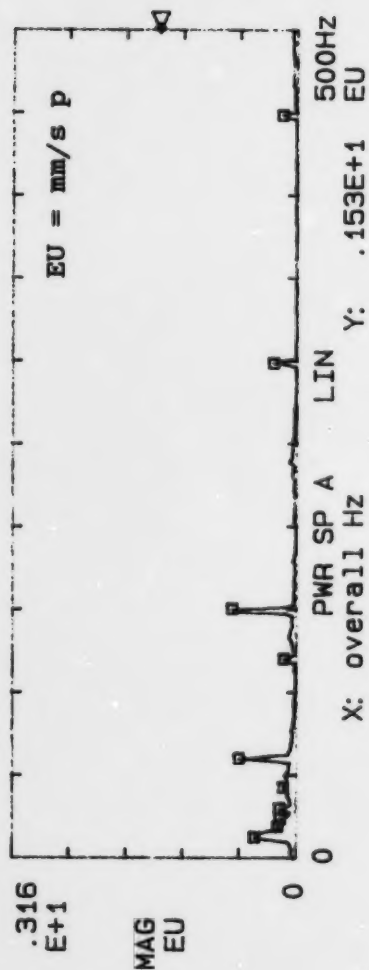
04: 33

FIGURE A-27 : PUMPSET #5, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #5 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	EU
1	150.00Hz	.715E+0	EU
2	60.00	.634E+0	
3	12.50	.473E+0	
4	298.75	.258E+0	
5	18.75	.212E+0	
6	30.00	.197E+0	
7	23.75	.181E+0	
8	448.75	.159E+0	
9	42.50	.154E+0	
10	120.00	.149E+0	

ABOVE PUMP BOWL > VERTICAL

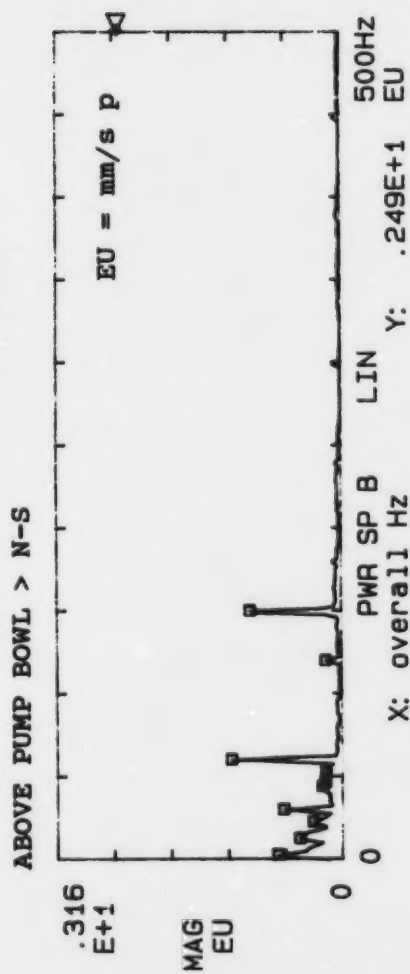


03: 43

FIGURE A-28 : PUMPSET #5, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #5 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

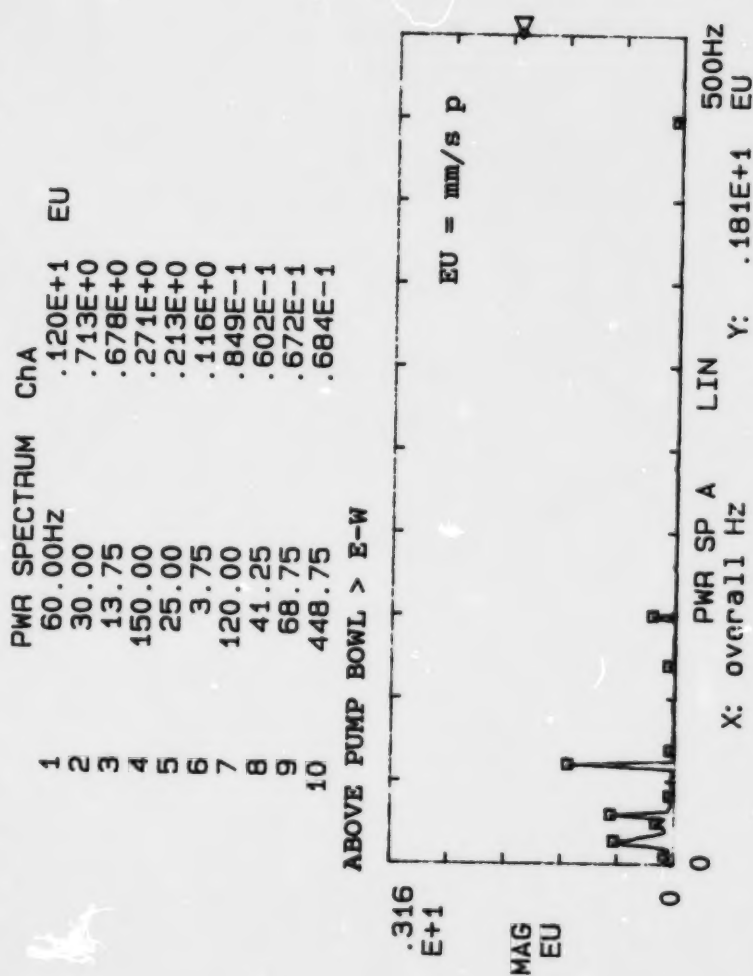
	PWR SPECTRUM	ChB	EU
1	60.00Hz	.123E+1	EU
2	150.00	.102E+1	
3	2.50	.725E+0	
4	30.00	.659E+0	
5	12.50	.475E+0	
6	22.50	.334E+0	
7	43.75	.223E+0	
8	46.25	.189E+0	
9	52.50	.185E+0	
10	120.00	.184E+0	



03: 47

FIGURE A-29 : PUMPSET #5, VIBRATION SPECTRA ABOVE PUMP POWL

PICKERING A U1 P.H.T. PUMPSET #5 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K



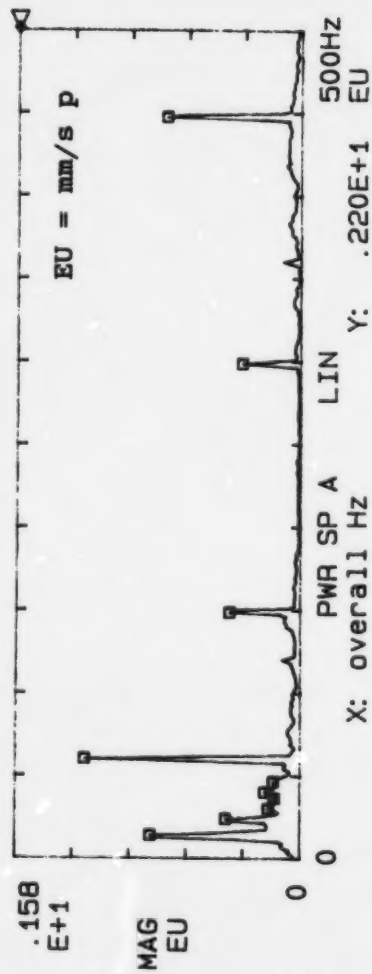
04: 35

FIGURE A-30 : PUMPSET #5, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #6 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.121E+1	EU
2	13.75	.835E+0	
3	447.50	.757E+0	
4	23.75	.417E+0	
5	148.75	.403E+0	
6	298.75	.334E+0	
7	40.00	.199E+0	
8	30.00	.180E+0	
9	46.25	.151E+0	
10	36.25	.146E+0	

TOP OF MOTOR > VERTICAL



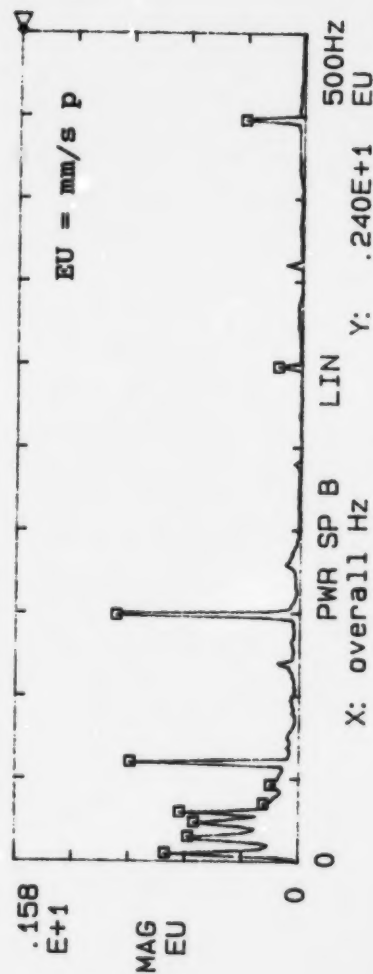
02: 14

FIGURE A-31 : PUMPSET #6, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #6 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	EU
1	148.75Hz	.103E+1	EU
2	60.00	.946E+0	
3	5.00	.750E+0	
4	30.00	.667E+0	
5	15.00	.621E+0	
6	23.75	.588E+0	
7	447.50	.330E+0	
8	35.00	.199E+0	
9	46.25	.161E+0	
10	298.75	.135E+0	

TOP OF MOTOR > N-S



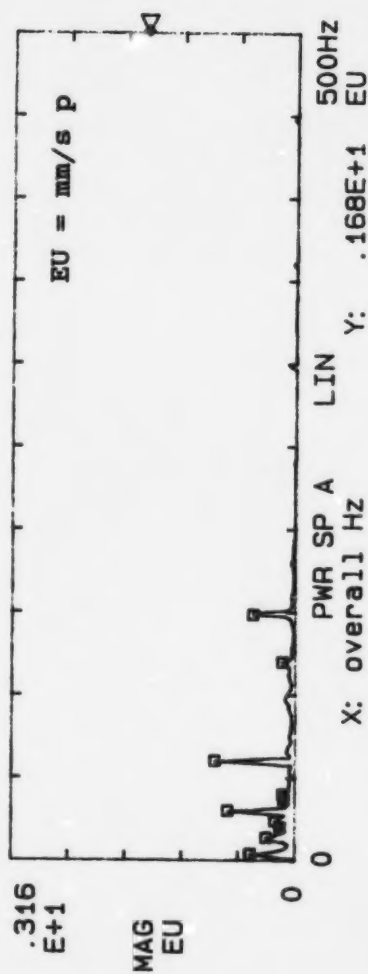
02:15

FIGURE A-32 : PUMPSET #6, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #6 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.905E+0	EU
2	30.00	.755E+0	
3	3.75	.509E+0	
4	148.75	.478E+0	
5	13.75	.334E+0	
6	23.75	.228E+0	
7	20.00	.170E+0	
8	120.00	.154E+0	
9	40.00	.141E+0	
10	36.25	.129E+0	

TOP OF MOTOR > E-W



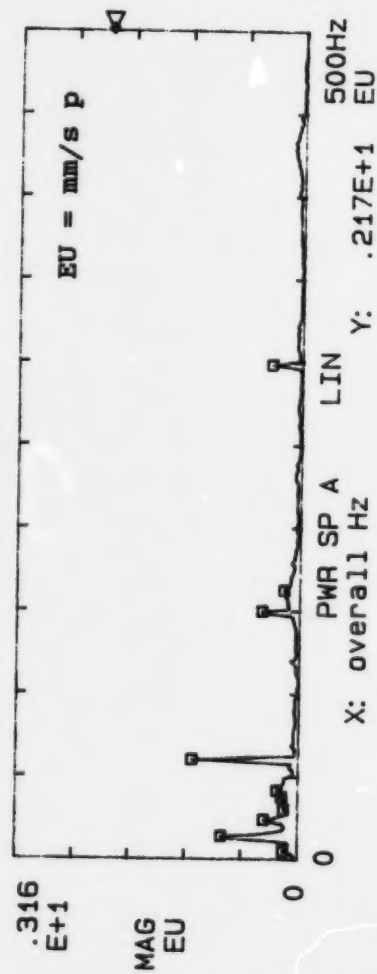
03:01

FIGURE A-33 : PUMPSET #6, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #6 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.120E+1	EU
2	13.75	.864E+0	
3	150.00	.427E+0	
4	23.75	.394E+0	
5	298.75	.355E+0	
6	41.25	.240E+0	
7	37.50	.191E+0	
8	162.50	.180E+0	
9	5.00	.175E+0	
10	30.00	.166E+0	

ABOVE PUMP BOWL > VERTICAL



02: 18

FIGURE A-34 : PUMPSET #6, VIBRATION SPECTRA ABOVE PUMP BOWL

	PWR SPECTRUM	ChB	EU
1	148.75Hz		.138E+1
2	60.00		.974E+0
3	30.00		.809E+0
4	23.75		.504E+0
5	15.00		.479E+0
6	6.25		.434E+0
7	52.50		.237E+0
8	45.00		.233E+0
9	163.75		.141E+0
10	68.75		.129E+0

ABOVE PUMP BOWL > N-S

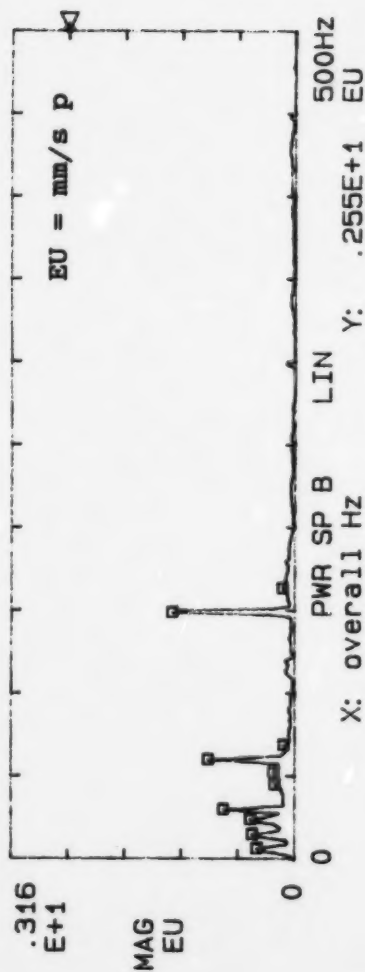


FIGURE A-35 : PUMPSET #6, VIBRATION SPECTRA ABOVE PUMP BOWL

02:19

PICKERING A U1 P.H.T. PUMPSET #6 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	60.00Hz	.907E+0	EU
2	30.00	.750E+0	
3	5.00	.634E+0	
4	12.50	.447E+0	
5	150.00	.281E+0	
6	20.00	.191E+0	
7	40.00	.167E+0	
8	45.00	.115E+0	
9	120.00	.810E-1	
10	68.75	.721E-1	

ABOVE PUMP BOWL > E-W

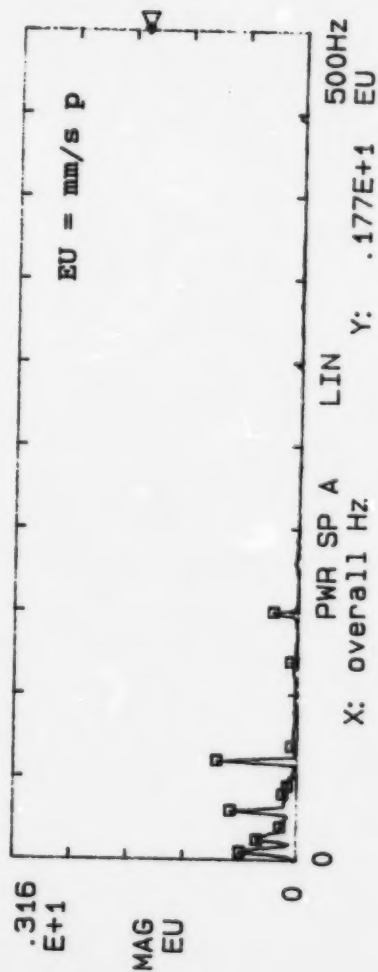


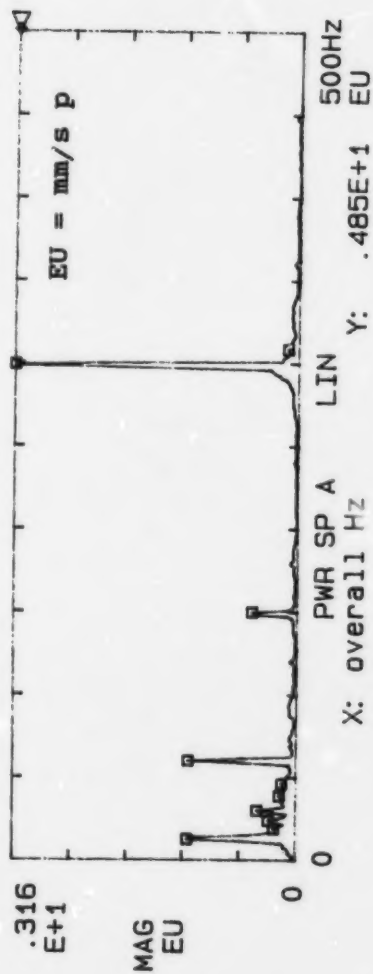
FIGURE A-36 : PUMPSET #6, VIBRATION SPECTRA ABOVE PUMP BOWL

03:03

PICKERING A U1 P.H.T. PUMPSET #7 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	298.75Hz	.419E+1	EU
2	12.50	.122E+1	
3	60.00	.121E+1	
4	150.00	.510E+0	
5	30.00	.443E+0	
6	23.75	.308E+0	
7	18.75	.249E+0	
8	38.75	.193E+0	
9	46.25	.168E+0	
10	308.75	.119E+0	

TOP OF MOTOR > VERTICAL



02: 22

FIGURE A-37 : PUMPSET #7, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #7 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB
1	150.00Hz	.149E+1 EU
2	60.00	.950E+0
3	22.50	.668E+0
4	298.75	.573E+0
5	5.00	.503E+0
6	13.75	.500E+0
7	30.00	.372E+0
8	45.00	.159E+0
9	120.00	.123E+0
10	52.50	.111E+0

TOP OF MOTOR > N-S

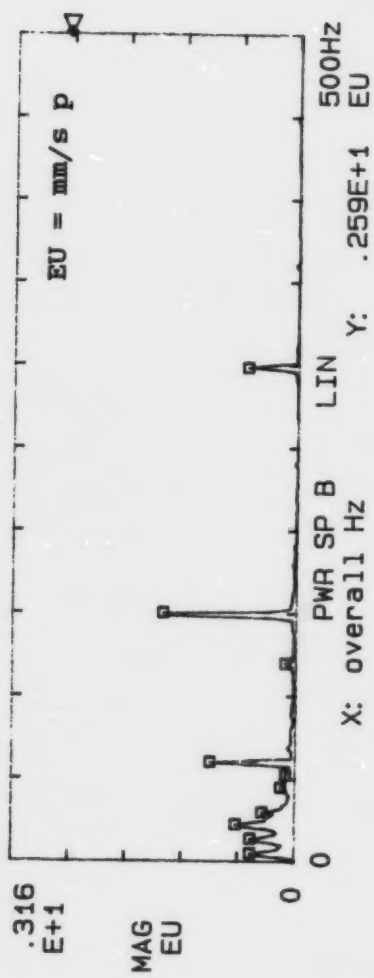


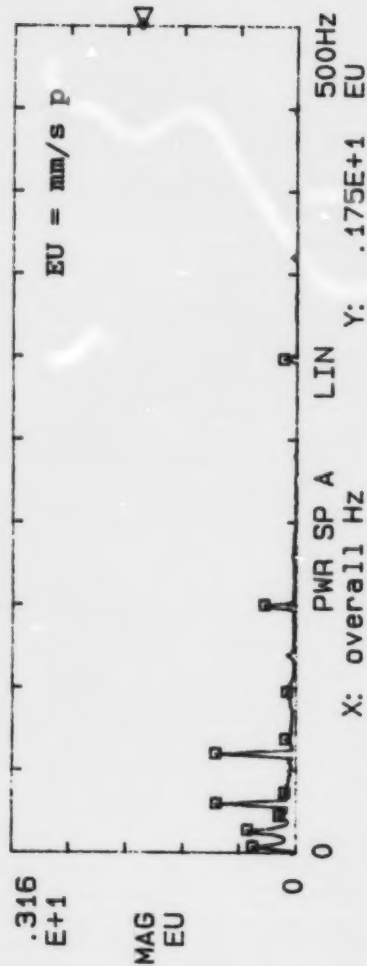
FIGURE A-38 : PUMPSET #7, VIBRATION SPECTRA AT TOP OF MOTOR

02:23

PICKERING A U1 P.H.T. PUMPSET #7 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	60.00Hz	.909E+0	
2	30.00	.893E+0	
3	13.75	.554E+0	
4	3.75	.490E+0	
5	150.00	.358E+0	
6	22.50	.189E+0	
7	298.75	.151E+0	
8	36.25	.137E+0	
9	68.75	.120E+0	
10	97.50	.103E+0	

TOP OF MOTOR > E-W



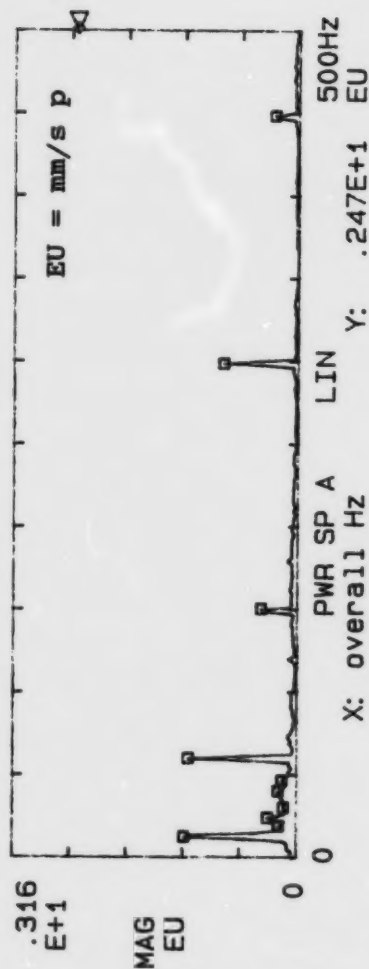
03:05

FIGURE A-39 : PUMPSET #7, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #7 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	12.50Hz	.126E+1	EU
2	60.00	.121E+1	
3	298.75	.835E+0	
4	150.00	.410E+0	
5	23.75	.330E+0	
6	448.75	.271E+0	
7	40.00	.210E+0	
8	18.75	.205E+0	
9	46.25	.176E+0	
10	30.00	.156E+0	

ABOVE PUMP BOWL > VERTICAL



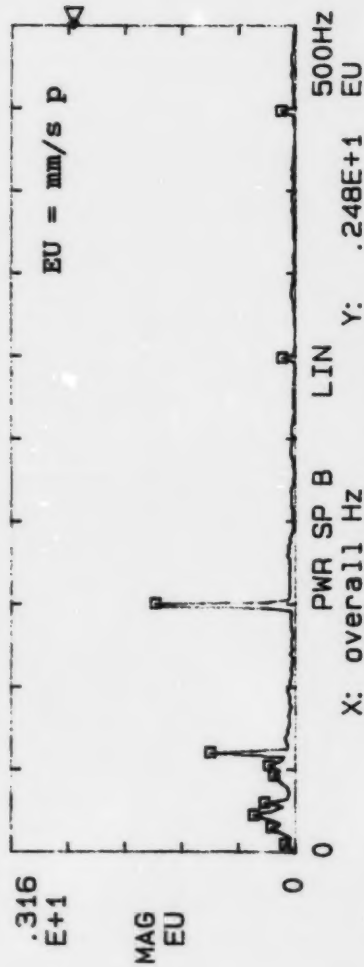
02: 26

FIGURE A-40 : PUMPSET #7, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #7 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	
1	150.00Hz	.157E+1	EU
2	60.00	.954E+0	
3	22.50	.472E+0	
4	30.00	.350E+0	
5	52.50	.299E+0	
6	15.00	.272E+0	
7	46.25	.240E+0	
8	448.75	.162E+0	
9	298.75	.157E+0	
10	5.00	.120E+0	

ABOVE PUMP BOWL > N-S



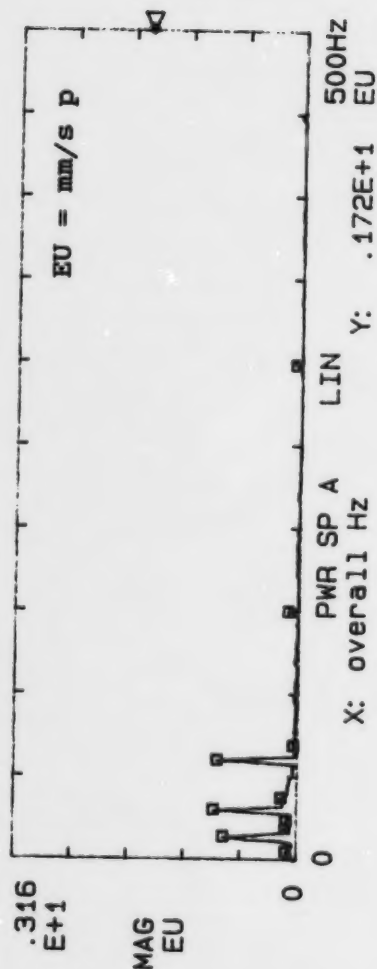
02: 27

FIGURE A-41 : PUMPSET #7, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #7 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	30.00Hz	.935E+0	EU
2	60.00	.907E+0	
3	13.75	.823E+0	
4	37.50	.178E+0	
5	18.75	.135E+0	
6	5.00	.122E+0	
7	23.75	.125E+0	
8	150.00	.125E+0	
9	298.75	.709E-1	
10	68.75	.558E-1	

ABOVE PUMP BOWL > E-W



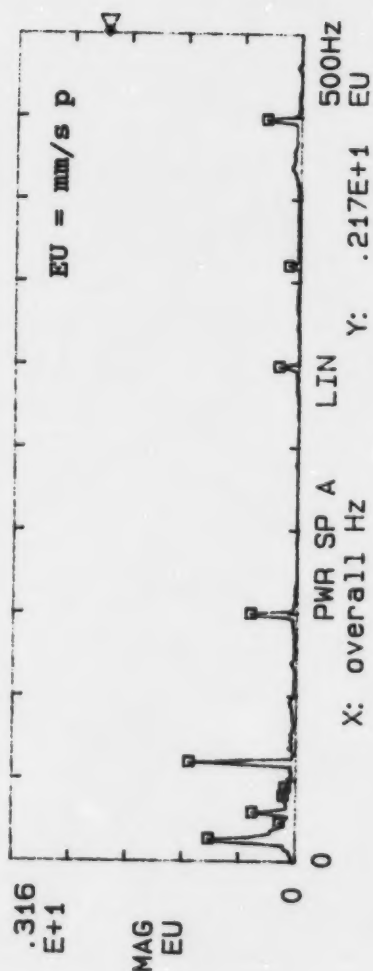
03:07

FIGURE A-42 : PUMPSET #7, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #8 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	EU
1	60.00Hz	.121E+1	EU
2	13.75	.973E+0	
3	150.00	.519E+0	
4	30.00	.490E+0	
5	448.75	.393E+0	
6	298.75	.235E+0	
7	23.75	.187E+0	
8	40.00	.148E+0	
9	360.00	.136E+0	
10	45.00	.120E+0	

TOP OF MOTOR > VERTICAL



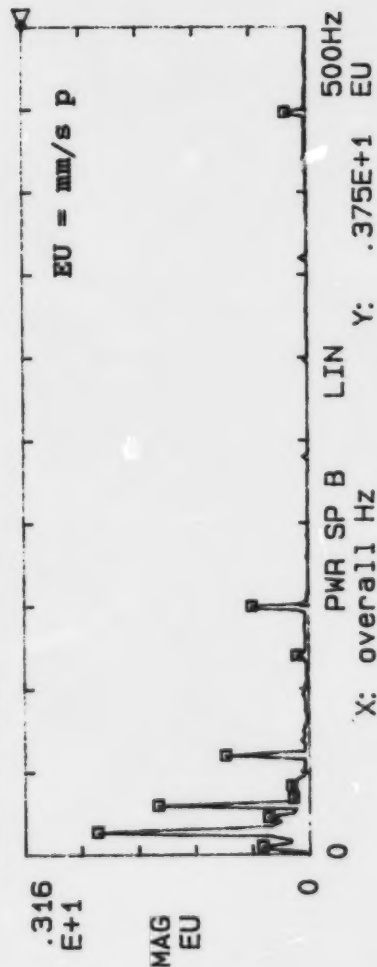
02:30

FIGURE A-43 : PUMPSET #8, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #8 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB	EU
1	13.75Hz	.237E+1	EU
2	30.00	.169E+1	
3	60.00	.938E+0	
4	150.00	.642E+0	
5	5.00	.526E+0	
6	22.50	.459E+0	
7	448.75	.244E+0	
8	41.25	.198E+0	
9	33.75	.180E+0	
10	120.00	.144E+0	

TOP OF MOTOR > N-S



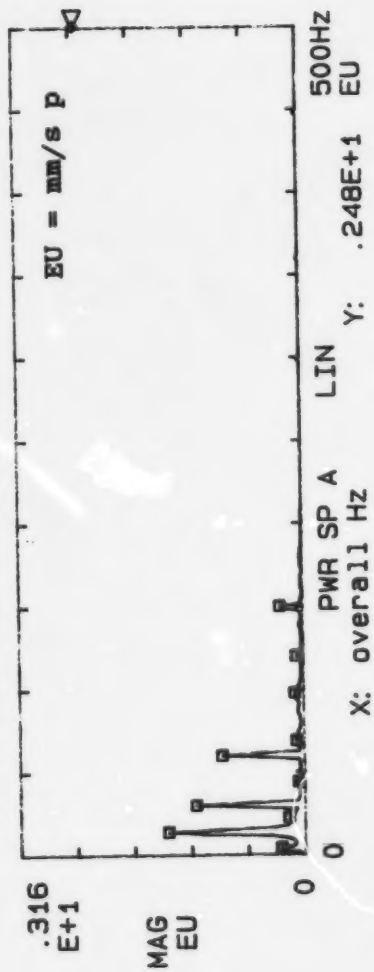
02: 31

FIGURE A-44 : PUMPSET #8, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #8 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	13.75Hz	.153E+1	EU
2	30.00	.122E+1	
3	60.00	.921E+0	
4	3.75	.277E+0	
5	150.00	.265E+0	
6	22.50	.181E+0	
7	97.50	.102E+0	
8	68.75	.967E-1	
9	120.00	.809E-1	
10	43.75	.733E-1	

TOP OF MOTOR > E-W



03:10

FIGURE A-45 : PUMPSET #8, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #8 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA
1	60.00Hz	.120E+1 EU
2	13.75	.105E+1
3	150.00	.466E+0
4	298.75	.192E+0
5	448.75	.185E+0
6	23.75	.169E+0
7	45.00	.141E+0
8	27.50	.111E+0
9	33.75	.115E+0
10	140.00	.110E+0

ABOVE PUMP BOWL > VERTICAL

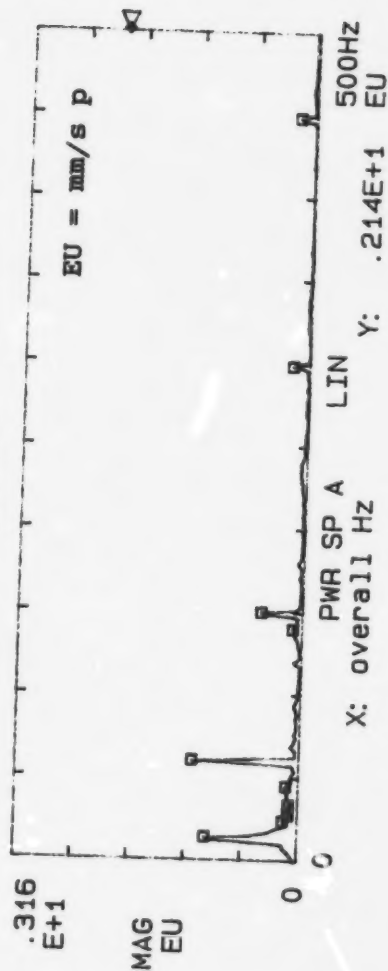


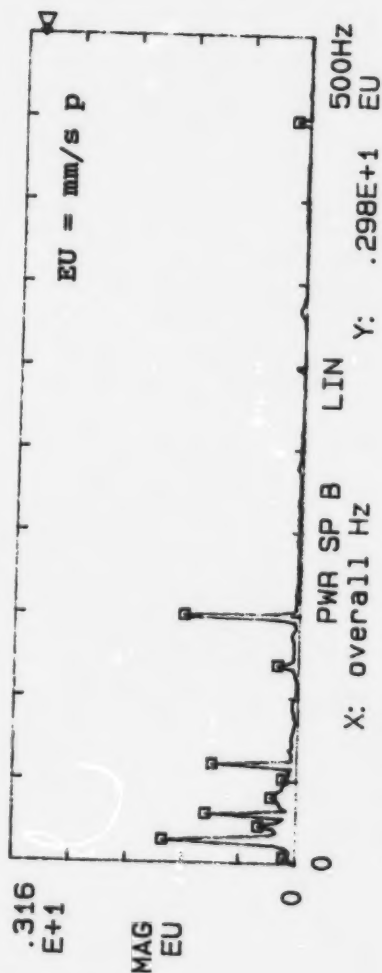
FIGURE A-46 : PUMPSET #8, VIBRATION SPECTRA ABOVE PUMP BOWL

02: 34

PICKERING A U1 P.H.T. PUMPSET #8 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	EU
1	13.75Hz	.150E+1	
2	150.00	.129E+1	
3	30.00	.102E+1	
4	60.00	.948E+0	
5	22.50	.433E+0	
6	40.00	.290E+0	
7	120.00	.246E+0	
8	51.25	.161E+0	
9	448.75	.150E+0	
10	3.75	.147E+0	

ABOVE PUMP BOWL > N-S



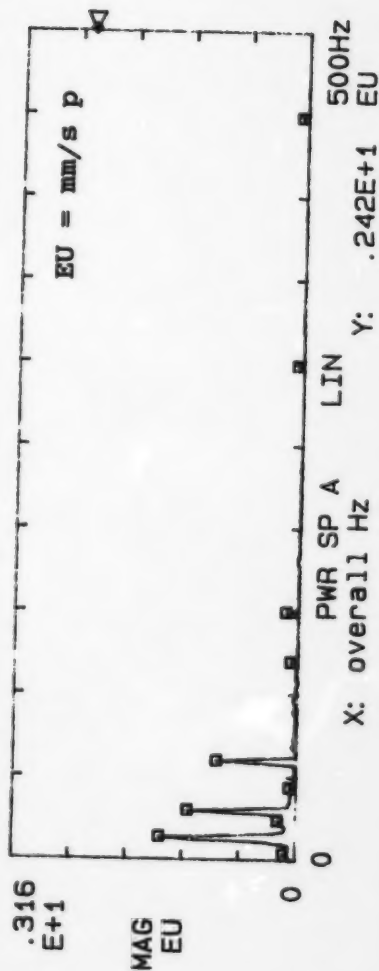
02: 35

FIGURE A-47 : PUMPSET #8, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #8 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	13.75Hz	.153E+1	EU
2	30.00	.122E+1	
3	60.00	.907E+0	
4	23.75	.210E+0	
5	150.00	.154E+0	
6	3.75	.144E+0	
7	120.00	.949E-1	
8	43.75	.794E-1	
9	298.75	.724E-1	
10	448.75	.714E-1	

ABOVE PUMP BOWL > E-W



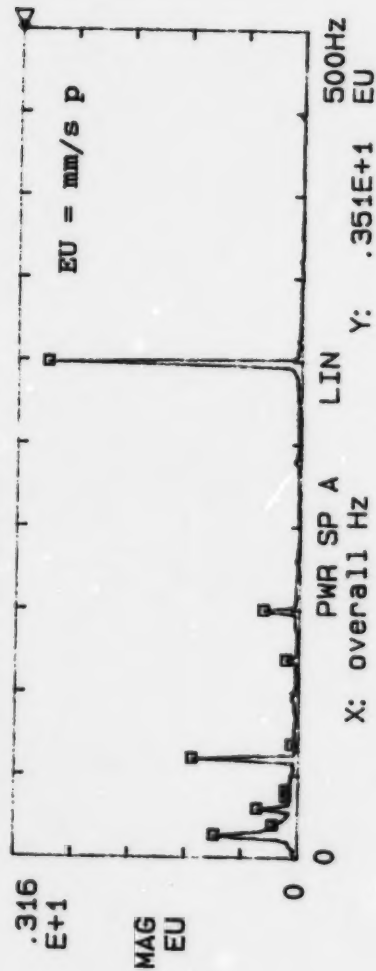
03: 12

FIGURE A-48 : PUMPSET #8, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #9 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	298.75Hz	.283E+1	EU
2	60.00	.120E+1	
3	13.75	.948E+0	
4	30.00	.466E+0	
5	150.00	.413E+0	
6	20.00	.294E+0	
7	120.00	.156E+0	
8	37.50	.139E+0	
9	41.25	.142E+0	
10	68.75	.798E-1	

TOP OF MOTOR > VERTICAL



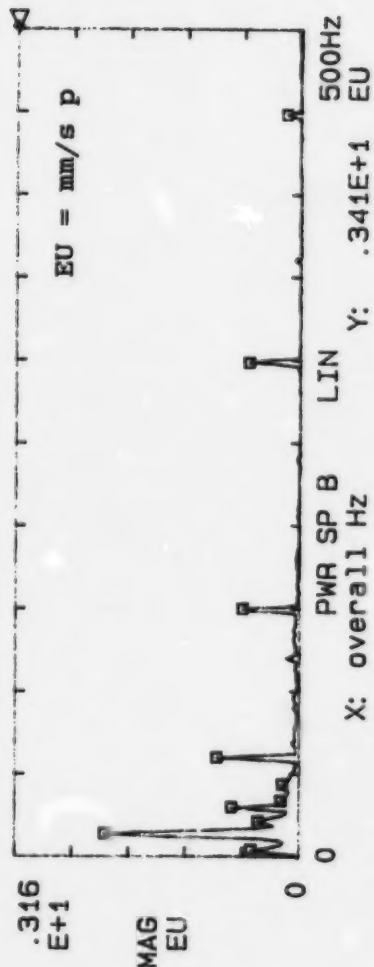
06: 25

FIGURE A-49 : PUMPSET #9, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #9 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB
1	13.75Hz	.217E+1 EU
2	60.00	.922E+0
3	30.00	.752E+0
4	150.00	.642E+0
5	298.75	.576E+0
6	3.75	.541E+0
7	21.25	.464E+0
8	33.75	.199E+0
9	43.75	.189E+0
10	448.75	.159E+0

TOP OF MOTOR > N-S



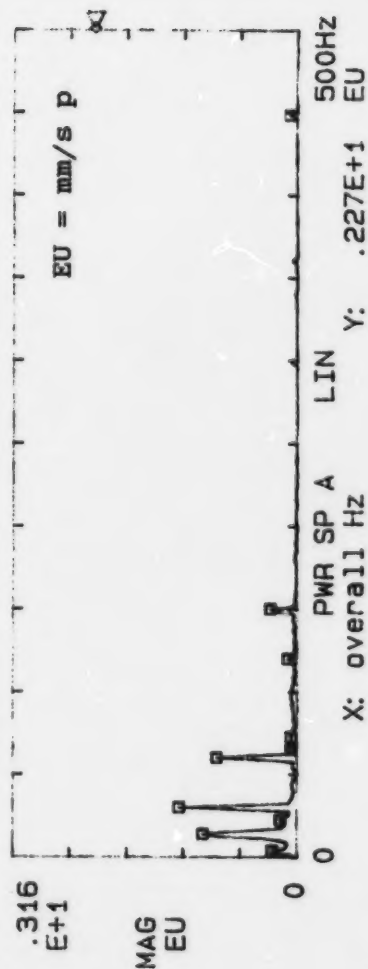
06:27

FIGURE A-50 : PUMPSET #9, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #9 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	30.00Hz	.132E+1	EU
2	13.75	.105E+1	
3	60.00	.908E+0	
4	150.00	.301E+0	
5	3.75	.282E+0	
6	22.50	.195E+0	
7	120.00	.989E-1	
8	448.75	.871E-1	
9	65.00	.765E-1	
10	72.50	.700E-1	

TOP OF MOTOR > E-W



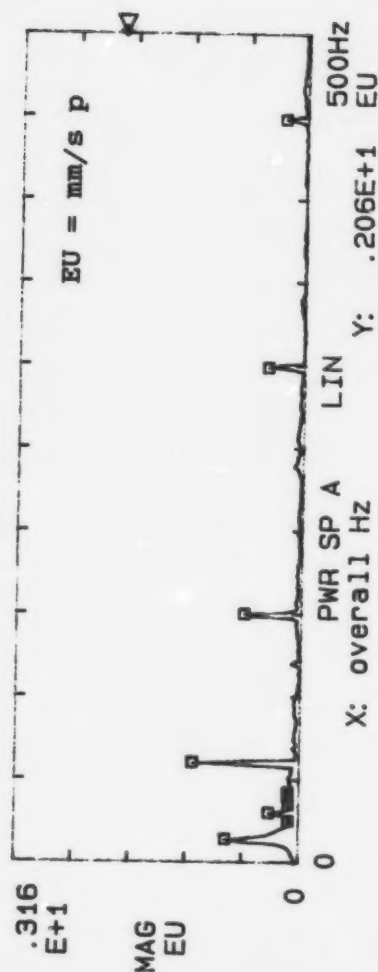
07:00

FIGURE A-51 : PUMPSET #9, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #9 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA
1	60.00Hz	.120E+1 EU
2	13.75	.828E+0
3	150.00	.643E+0
4	298.75	.414E+0
5	30.00	.338E+0
6	448.75	.250E+0
7	40.00	.129E+0
8	42.50	.135E+0
9	25.00	.125E+0
10	35.00	.119E+0

ABOVE PUMP BOWL > VERTICAL



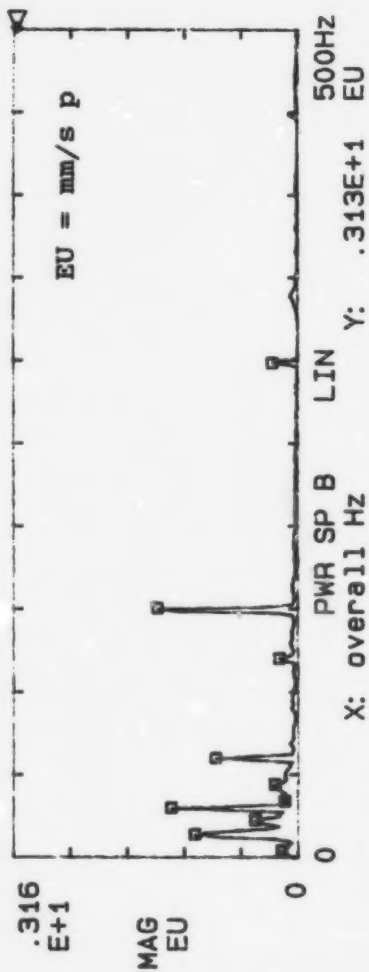
06:29

FIGURE A-52 : PUMPSET #9, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #9 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	EU
1	150.00Hz		.157E+1
2	30.00		.142E+1
3	13.75		.116E+1
4	60.00		.926E+0
5	22.50		.475E+0
6	298.75		.288E+0
7	43.75		.263E+0
8	120.00		.212E+0
9	3.75		.180E+0
10	33.75		.157E+0

ABOVE PUMP BOWL > N-S



06:30

FIGURE A-53 : PUMPSET #9, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #9 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA
1	30.00Hz	.101E+1 EU
2	13.75	.897E+0
3	60.00	.890E+0
4	22.50	.283E+0
5	150.00	.272E+0
6	298.75	.212E+0
7	3.75	.158E+0
8	43.75	.975E-1
9	120.00	.897E-1
10	52.50	.854E-1

ABOVE PUMP BOWL > E-W

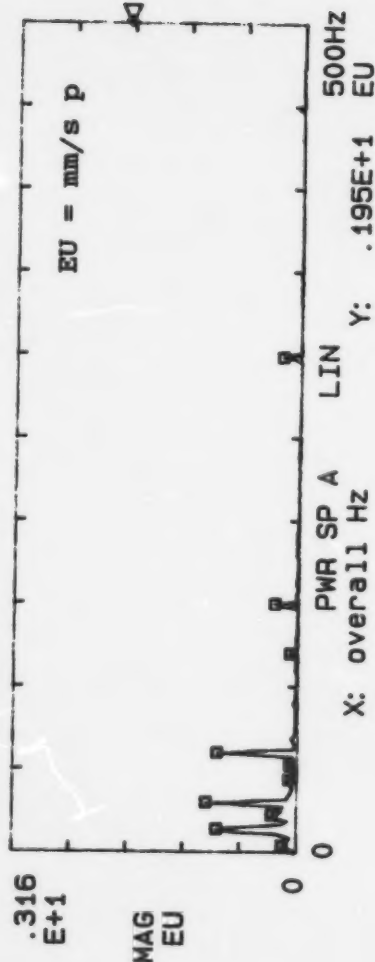
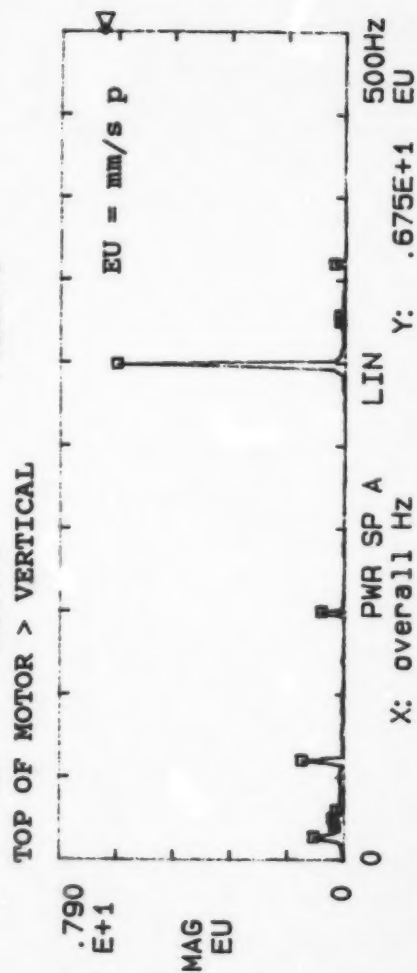


FIGURE A-54 : PUMPSET #9, VIBRATION SPECTRA ABOVE PUMP BOWL

07:02

PICKERING A U1 P.H.T. PUMPSET #10 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA
1	298.75Hz	.633E+1 EU
2	60.00	.120E+1
3	13.75	.875E+0
4	150.00	.649E+0
5	25.00	.344E+0
6	360.00	.306E+0
7	20.00	.268E+0
8	30.00	.223E+0
9	325.00	.162E+0
10	328.75	.155E+0

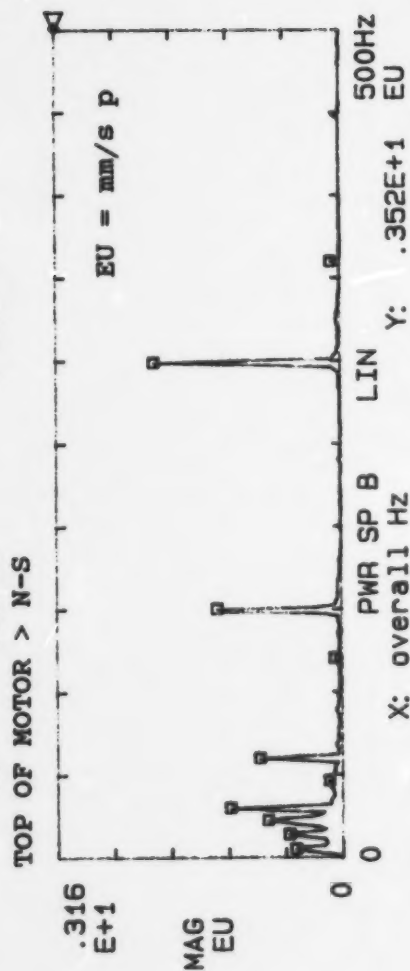


06:32

FIGURE A-55 : PUMPSET #10, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #10 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	EU
1	298.75Hz	.209E+1	EU
2	150.00	.139E+1	
3	30.00	.125E+1	
4	60.00	.920E+0	
5	22.50	.831E+0	
6	13.75	.602E+0	
7	5.00	.528E+0	
8	46.25	.151E+0	
9	360.00	.111E+0	
10	120.00	.888E-1	



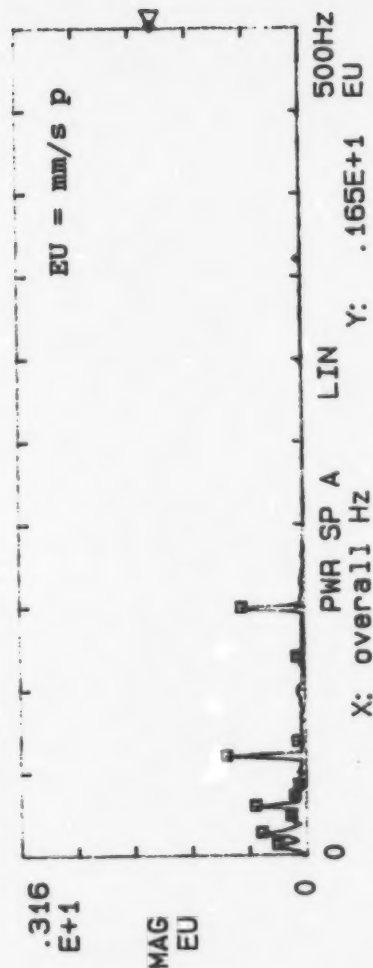
06:33

FIGURE A-56 : PUMPSET #10, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #10 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.881E+0	EU
2	150.00	.706E+0	
3	30.00	.570E+0	
4	13.75	.499E+0	
5	6.25	.317E+0	
6	23.75	.171E+0	
7	36.25	.123E+0	
8	68.75	.960E-1	
9	120.00	.932E-1	
10	42.50	.815E-1	

TOP OF MOTOR > E-W

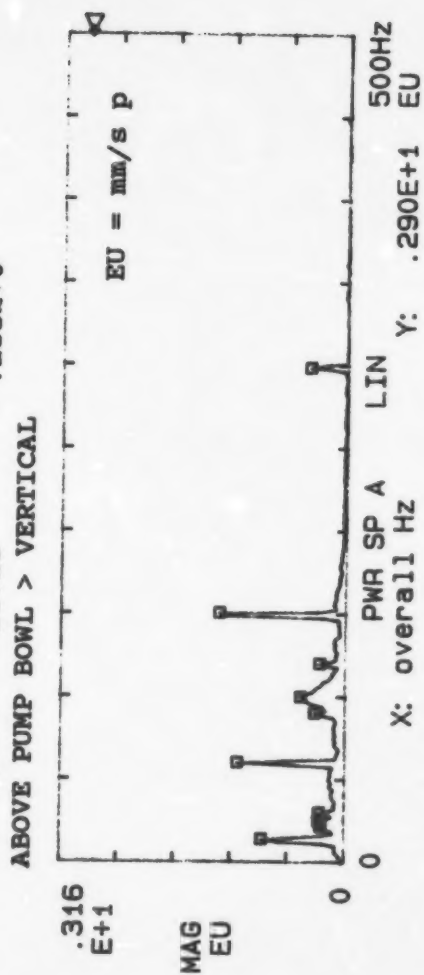


07:05

FIGURE A-57 : PUMPSET #10, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #10 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	EU
1	150.00Hz	.141E+1	
2	60.00	.120E+1	
3	13.75	.927E+0	
4	100.00	.499E+0	
5	298.75	.416E+0	
6	90.00	.346E+0	
7	25.00	.290E+0	
8	120.00	.292E+0	
9	30.00	.283E+0	
10	21.25	.263E+0	

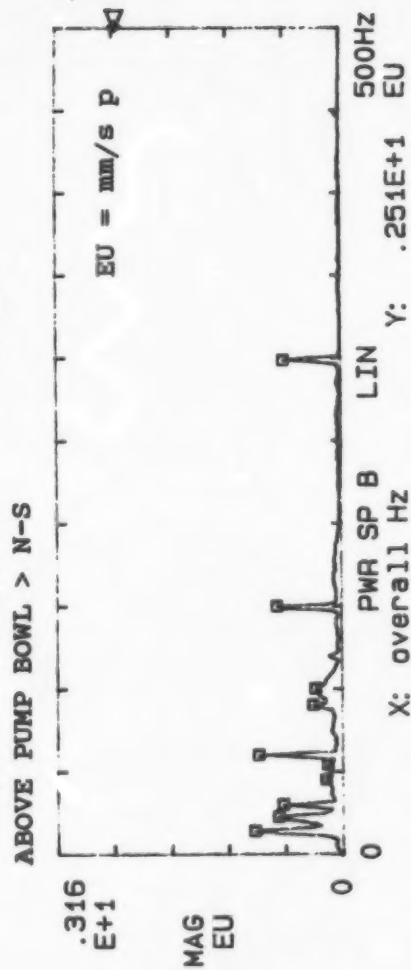


06:35

FIGURE A-58 : PUMPSET #10, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #10 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB	EU
1	13.75Hz	.987E+0	EU
2	60.00	.931E+0	
3	150.00	.725E+0	
4	22.50	.712E+0	
5	30.00	.662E+0	
6	298.75	.652E+0	
7	90.00	.331E+0	
8	100.00	.299E+0	
9	45.00	.196E+0	
10	53.75	.174E+0	



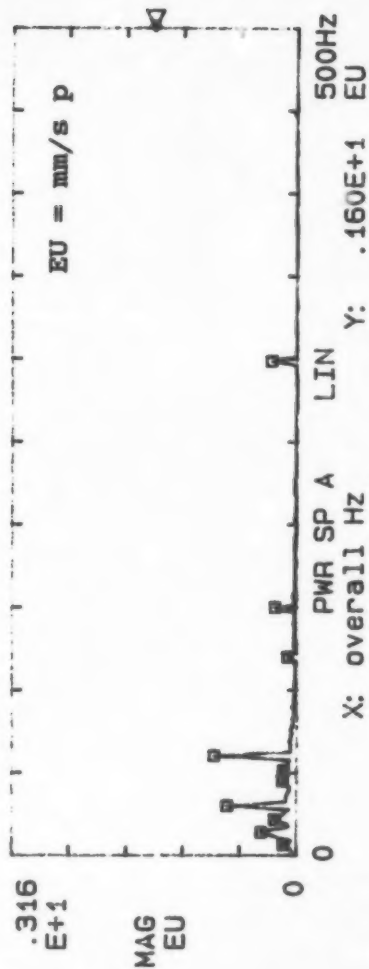
06:36

FIGURE A-59 : PUMPSET #10, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #10 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	EU
1	60.00Hz	.928E+0	EU
2	30.00	.772E+0	
3	13.75	.396E+0	
4	298.75	.293E+0	
5	21.25	.251E+0	
6	150.00	.241E+0	
7	45.00	.158E+0	
8	6.25	.152E+0	
9	51.25	.149E+0	
10	120.00	.106E+0	

ABOVE PUMP BOWL > E-W



07:08

FIGURE A-60 : PUMPSET #10, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #11 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	60.00Hz	.125E+1	EU
2	30.00	.865E+0	
3	13.75	.859E+0	
4	150.00	.497E+0	
5	448.75	.423E+0	
6	298.75	.351E+0	
7	25.00	.344E+0	
8	46.25	.155E+0	
9	38.75	.133E+0	
10	53.75	.103E+0	

TOP OF MOTOR > VERTICAL

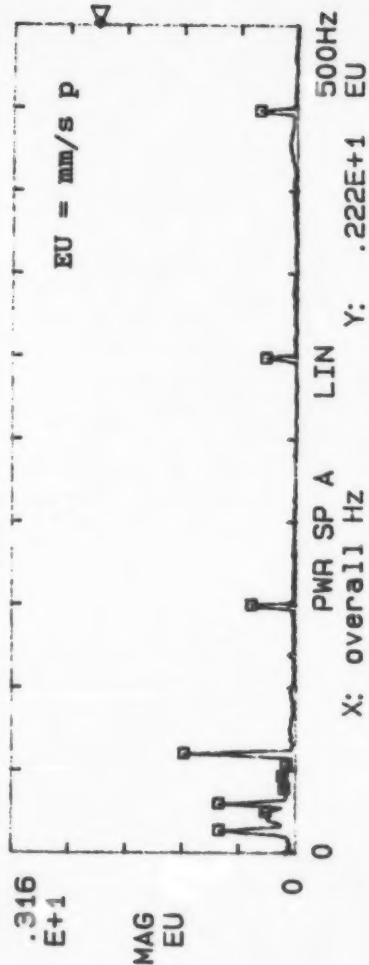


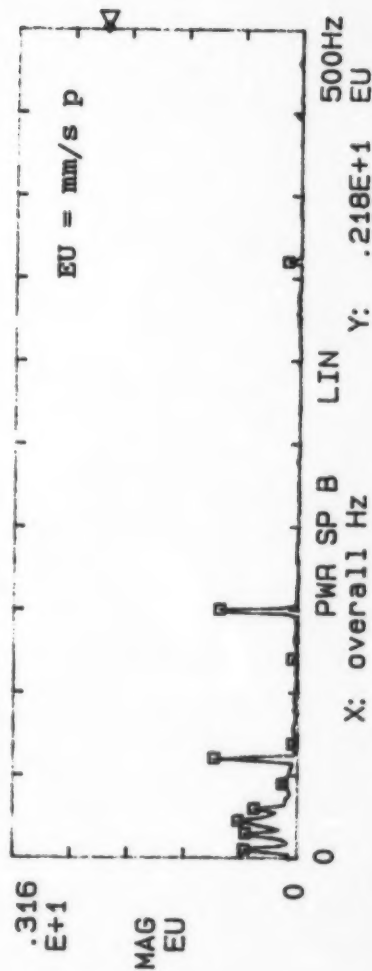
FIGURE A-61 : PUMPSET #11, VIBRATION SPECTRA AT TOP OF MOTOR

06: 38

PICKERING A U1 P.H.T. PUMPSET #11 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB	
1	60.00Hz	.938E+0	EU
2	150.00	.882E+0	
3	22.50	.668E+0	
4	5.00	.598E+0	
5	15.00	.588E+0	
6	30.00	.493E+0	
7	45.00	.176E+0	
8	360.00	.152E+0	
9	120.00	.770E-1	
10	68.75	.617E-1	

TOP OF MOTOR > N-S



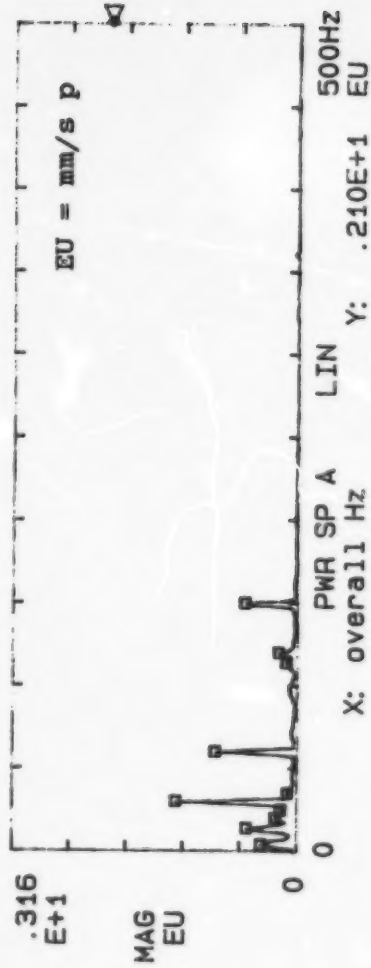
06:39

FIGURE A-62 : PUMPSET #11, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #11 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	30.00Hz	.135E+1	EU
2	60.00	.913E+0	
3	150.00	.589E+0	
4	13.75	.570E+0	
5	3.75	.396E+0	
6	20.00	.240E+0	
7	120.00	.213E+0	
8	25.00	.181E+0	
9	113.75	.122E+0	
10	35.00	.110E+0	

TOP OF MOTOR > E-W



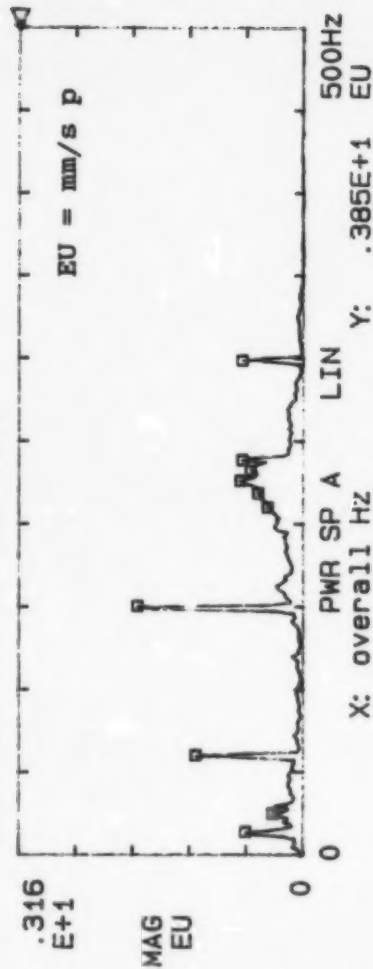
07:10

FIGURE A-63 : PUMPSET #11, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #11 (EU=MM/S PK)
 510Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	150.00Hz	.185E+1	EU
2	150.00	.121E+1	
3	226.25	.709E+0	
4	238.75	.687E+0	
5	298.75	.688E+0	
6	13.75	.653E+0	
7	232.50	.586E+0	
8	218.75	.508E+0	
9	210.00	.401E+0	
10	25.00	.342E+0	

ABOVE PUMP BOWL > VERTICAL

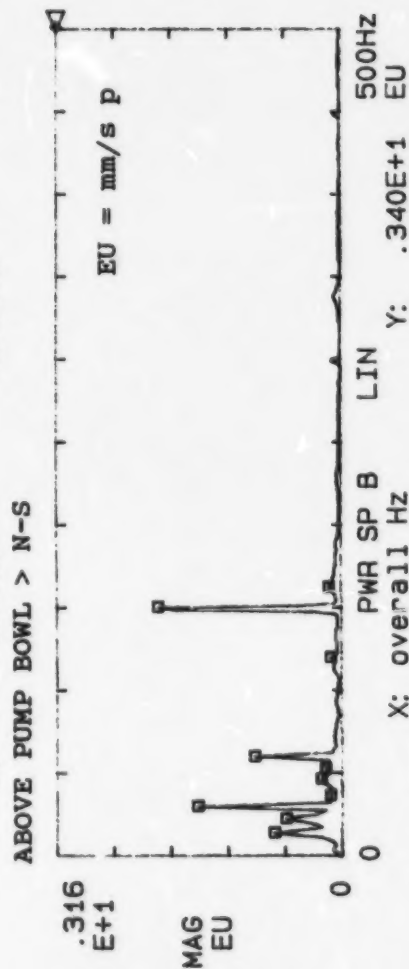


06: 41

FIGURE A-64 : PUMPSET #11, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #11 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

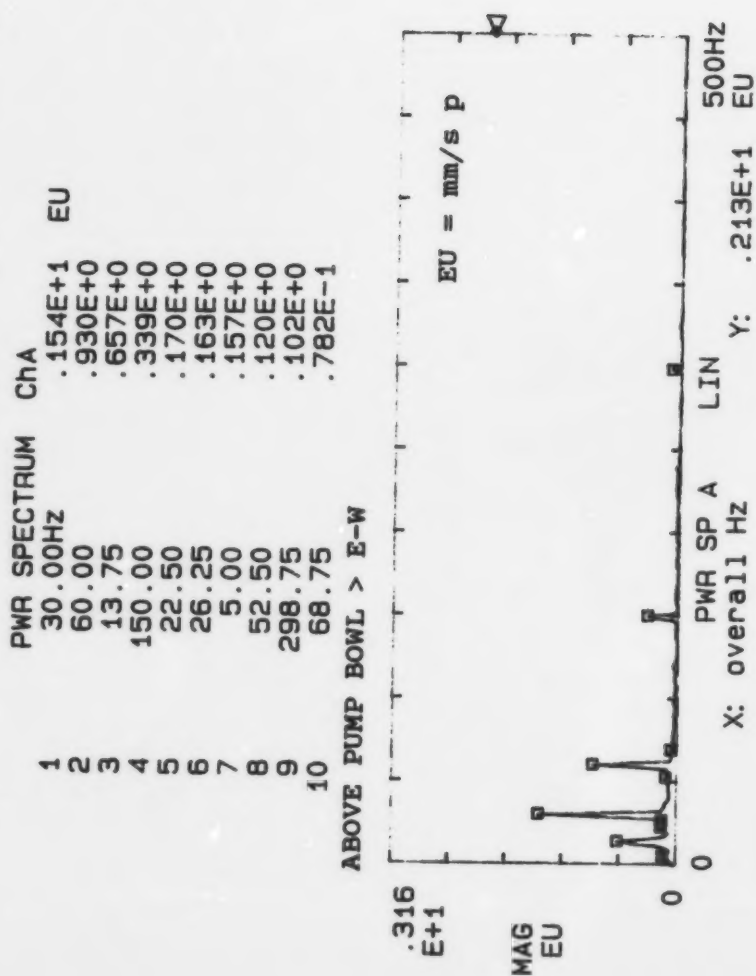
	PWR SPECTRUM	ChB	EU
1	150.00Hz	.204E+1	EU
2	30.00	.161E+1	
3	60.00	.975E+0	
4	13.75	.761E+0	
5	22.50	.624E+0	
6	46.25	.236E+0	
7	52.50	.179E+0	
8	162.50	.141E+0	
9	36.25	.135E+0	
10	120.00	.121E+0	



06:43

FIGURE A-65 : PUMPSET #11, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P:H.T. PUMPSET #11 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K



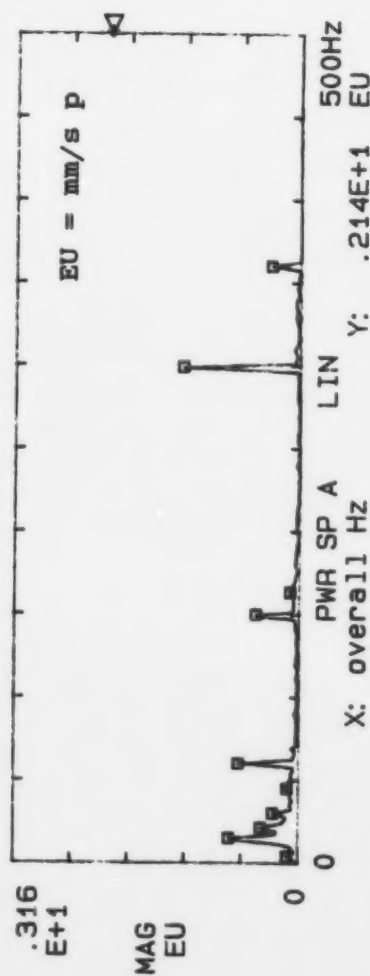
07:12

FIGURE A-66 : PUMPSET #11, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #12 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	298.75Hz	.131E+1	EU
2	15.00	.776E+0	
3	60.00	.675E+0	
4	150.00	.492E+0	
5	21.25	.419E+0	
6	360.00	.330E+0	
7	30.00	.297E+0	
8	3.75	.135E+0	
9	45.00	.135E+0	
10	163.75	.105E+0	

TOP OF MOTOR > VERTICAL

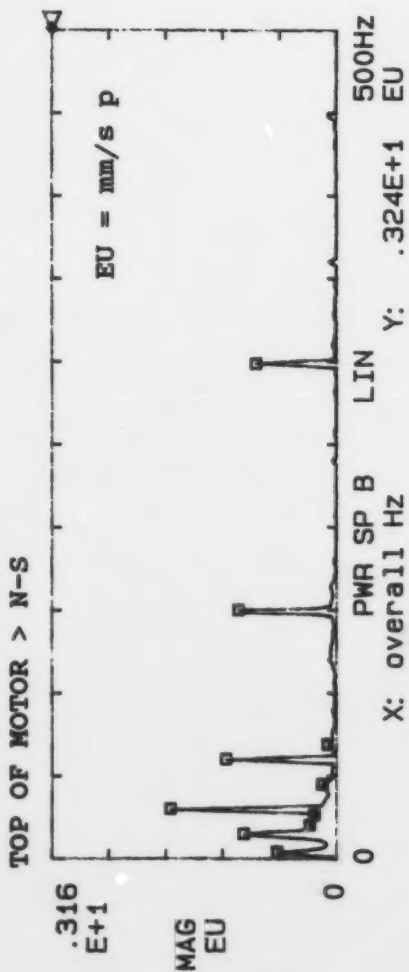


04: 13

FIGURE A-67 : PUMPSET #12, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #12 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	EU
1	30.00Hz	.185E+1	EU
2	60.00	.123E+1	
3	150.00	.109E+1	
4	15.00	.104E+1	
5	298.75	.908E+0	
6	3.75	.670E+0	
7	20.00	.303E+0	
8	26.25	.249E+0	
9	45.00	.168E+0	
10	68.75	.991E-1	

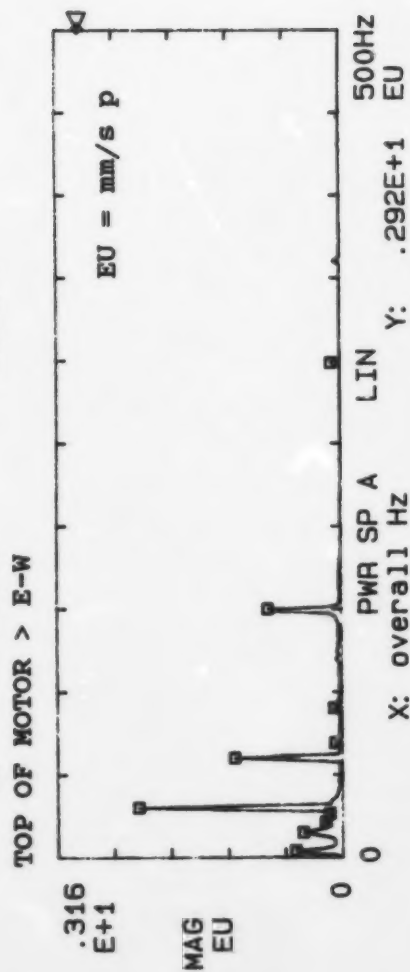


04:14

FIGURE A-68 : PUMPSET #12, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #12 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

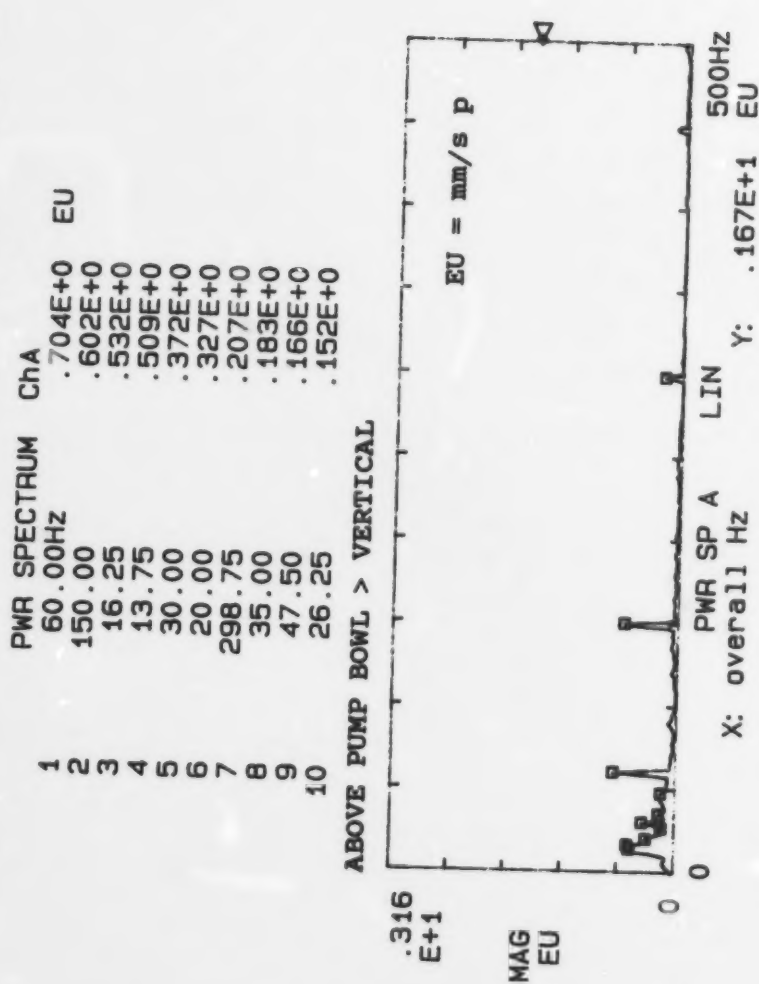
	PWR SPECTRUM	ChA	EU
1	30.00Hz	.226E+1	
2	60.00	.121E+1	
3	150.00	.826E+0	
4	3.75	.524E+0	
5	15.00	.440E+0	
6	21.25	.193E+0	
7	26.25	.141E+0	
8	298.75	.107E+0	
9	90.00	.912E-1	
10	68.75	.875E-1	



03:01

FIGURE A-69 : PUMPSET #12, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #12 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

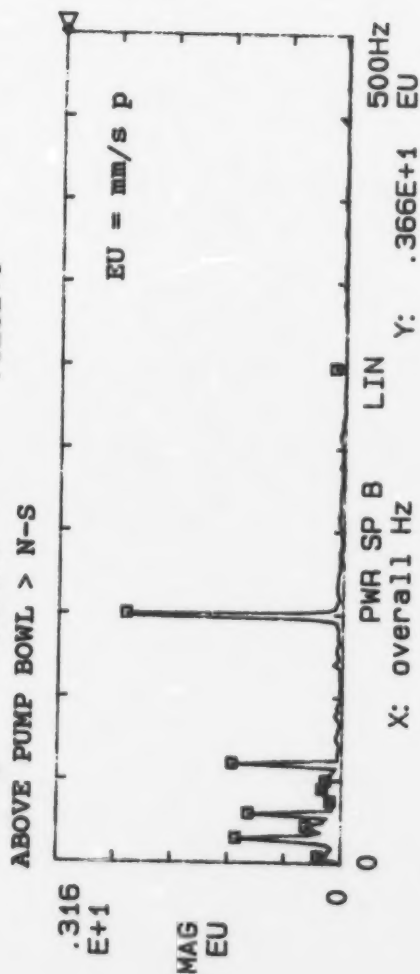


04: 16

FIGURE A-70 : PUMPSET #12, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #12 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

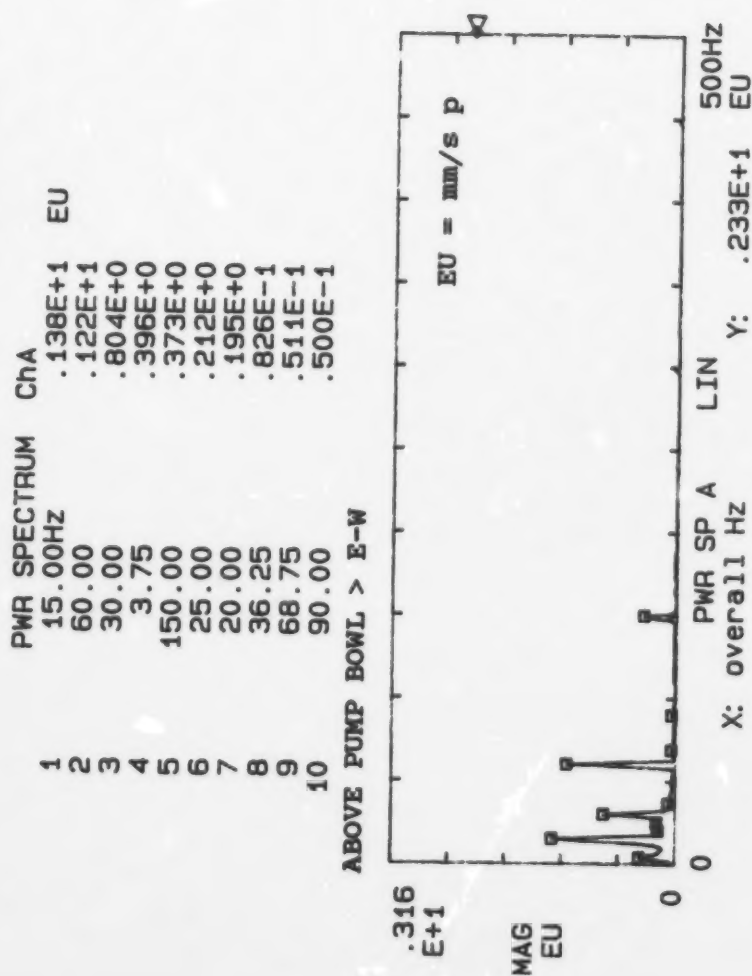
	PWR SPECTRUM	ChB	EU
1	150.00Hz	.242E+1	EU
2	60.00	.123E+1	
3	15.00	.118E+1	
4	30.00	.104E+1	
5	22.50	.398E+0	
6	3.75	.267E+0	
7	45.00	.221E+0	
8	50.00	.184E+0	
9	37.50	.130E+0	
10	298.75	.129E+0	



04: 17

FIGURE A-71 : PUMPSET #12, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #12 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K



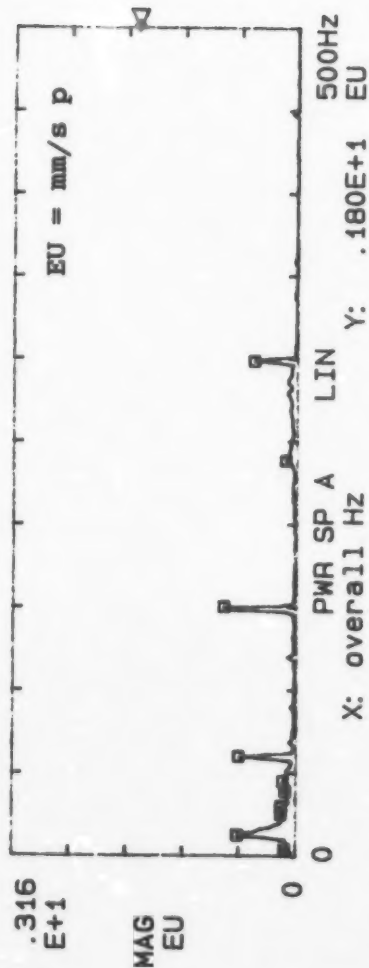
03: 03

FIGURE A-72 : PUMPSET #12, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #13 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	150.00Hz	.813E+0	EU
2	12.50	.653E+0	
3	60.00	.651E+0	
4	298.75	.488E+0	
5	25.00	.171E+0	
6	30.00	.175E+0	
7	45.00	.149E+0	
8	3.75	.136E+0	
9	238.75	.132E+0	
10	38.75	.124E+0	

TOP OF MOTOR > VERTICAL



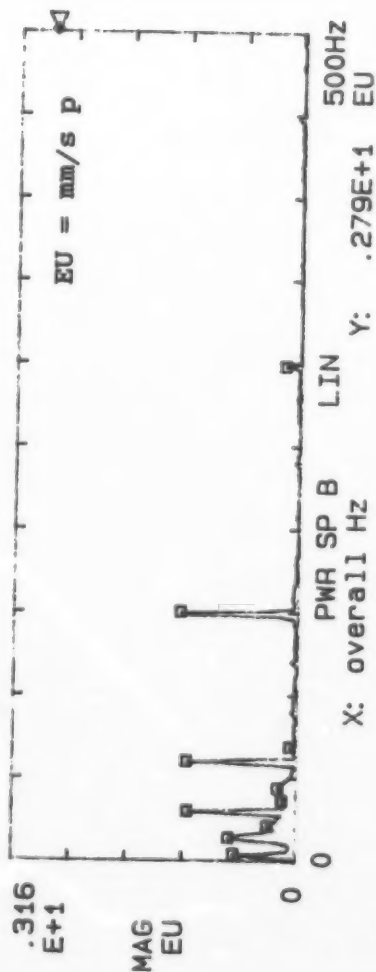
03: 34

FIGURE A-73 : PUMPSET #13, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #13 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	EU
1	150.00Hz	.132E+1	
2	60.00	.123E+1	
3	30.00	.122E+1	
4	13.75	.758E+0	
5	3.75	.696E+0	
6	21.25	.325E+0	
7	43.75	.211E+0	
8	298.75	.181E+0	
9	36.25	.162E+0	
10	68.75	.853E-1	

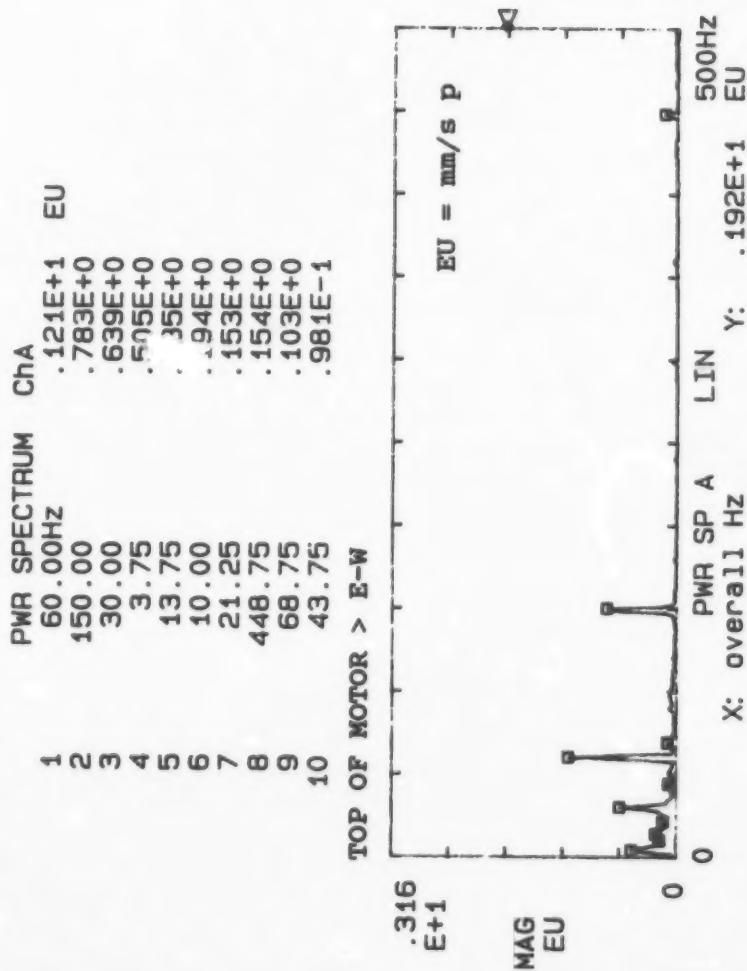
TOP OF MOTOR > N-S



03:35

FIGURE A-74 : PUMPSET #13, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #13 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k



04: 28

FIGURE A-75 : PUMPSET #13, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #13 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	150.00Hz	.834E+0	EU
2	60.00	.639E+0	
3	12.50	.517E+0	
4	448.75	.517E+0	
5	298.75	.244E+0	
6	30.00	.232E+0	
7	8.75	.154E+0	
8	25.00	.144E+0	
9	40.00	.121E+0	
10	43.75	.113E+0	

ABOVE PUMP BOWL > VERTICAL

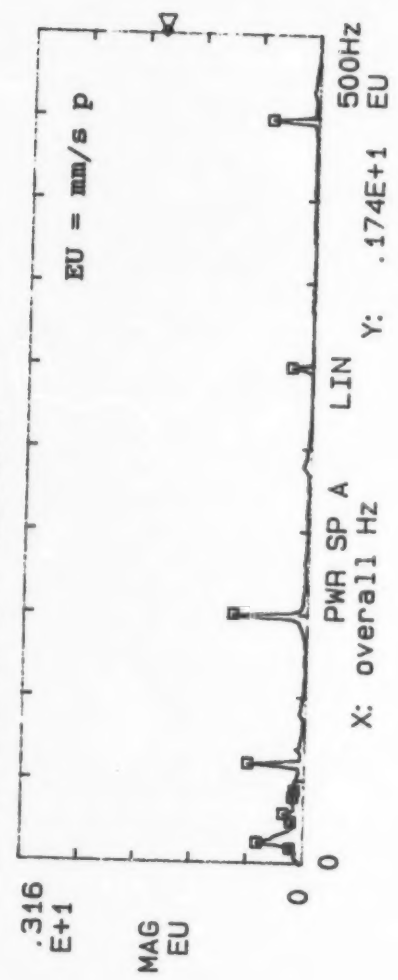


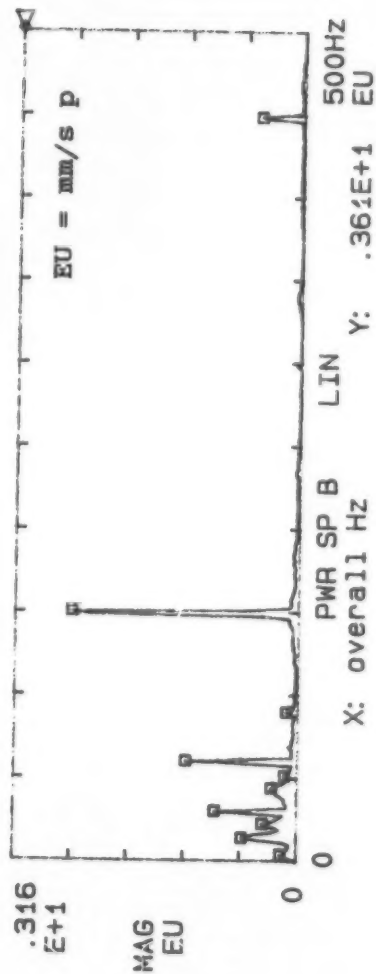
FIGURE A-76 : PUMPSET #13, VIBRATION SPECTRA ABOVE PUMP BOWL

03:37

PICKERING A U1 P.H.T. PUMPSET #13 (EU=MM/S PK)
 500HZ A: AC/0.5V B: AC/0.5V S.SUM b4/64 DUAL 1k

	PWR SPECTRUM	ChB	EU
1	150.00Hz	.254E+1	EU
2	60.00	.125E+1	
3	30.00	.929E+0	
4	13.75	.616E+0	
5	448.75	.478E+0	
6	22.50	.392E+0	
7	43.75	.291E+0	
8	3.75	.185E+0	
9	51.25	.144E+0	
10	90.00	.138E+0	

ABOVE PUMP BOWL > N-S



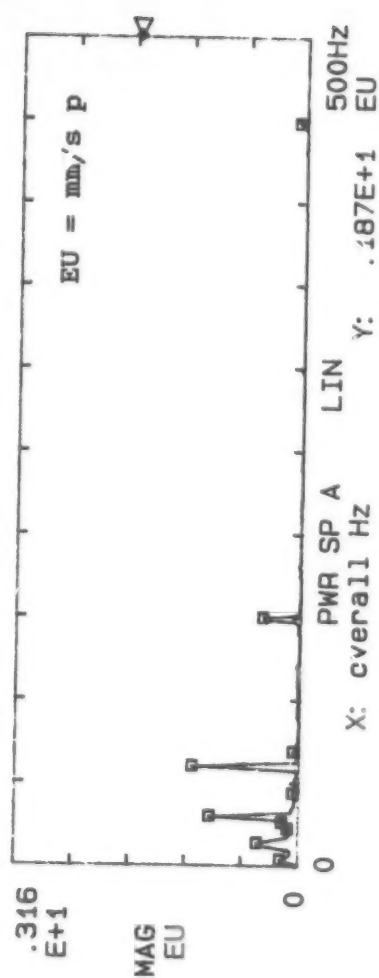
03: 38

FIGURE A-77 : PUMPSET #13, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #13 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.121E+1	EU
2	30.00	.101E+1	
3	13.75	.466E+0	
4	150.00	.432E+0	
5	3.75	.203E+0	
6	26.25	.193E+0	
7	22.50	.126E+0	
8	448.75	.817E-1	
9	43.75	.737E-1	
10	68.75	.753E-1	

ABOVE PUMP BOWL > E-W



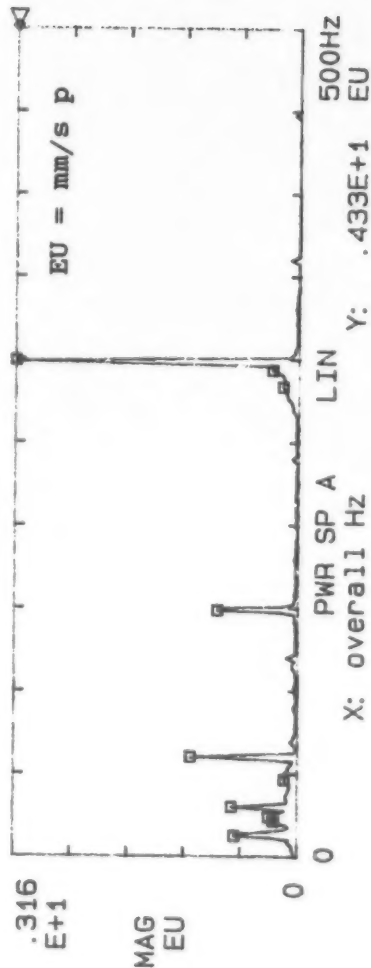
04:31

FIGURE A-78 : PUMPSET #13, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #14 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA
1	298.75Hz	.365E+1 EU
2	60.00	.120E+1
3	148.75	.909E+0
4	30.00	.737E+0
5	12.50	.709E+0
6	23.75	.326E+0
7	293.75	.299E+0
8	21.25	.271E+0
9	283.75	.181E+0
10	46.25	.152E+0

TOP OF MOTOR > VERTICAL



02: 37

FIGURE A-79 : PUMPSET #14, VIBRATION SPECTRA AT TOP OF MOTOR

	PWR SPECTRUM	ChB	EU
1	298.75Hz	.185E+1	
2	30.00	.150E+1	
3	148.75	.134E+1	
4	60.00	.950E+0	
5	21.25	.595E+0	
6	15.00	.418E+0	
7	5.00	.260E+0	
8	45.00	.158E+0	
9	293.75	.149E+0	
10	68.75	.883E-1	

TOP OF MOTOR > N-S

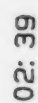
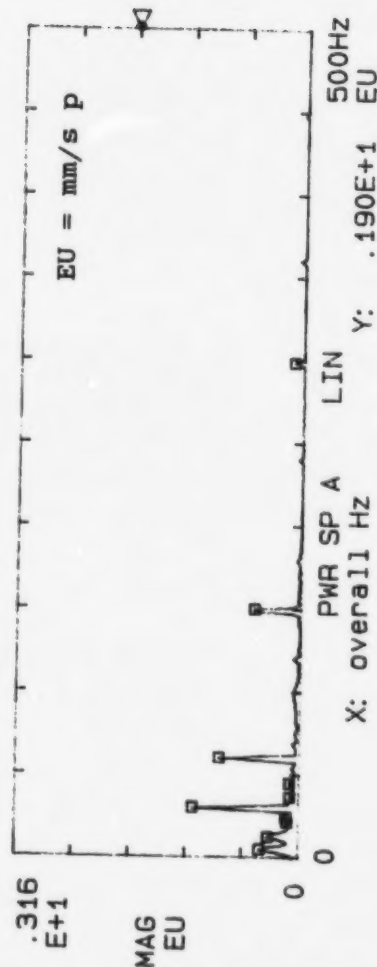


FIGURE A-80 : PUMPSET #14, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #14 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	30.00Hz	.120E+1	EU
2	60.00	.907E+0	
3	150.00	.533E+0	
4	5.00	.443E+0	
5	12.50	.347E+0	
6	23.75	.141E+0	
7	21.25	.133E+0	
8	45.00	.115E+0	
9	298.75	.115E+0	
10	36.25	.100E+0	

TOP OF MOTOR > E-W



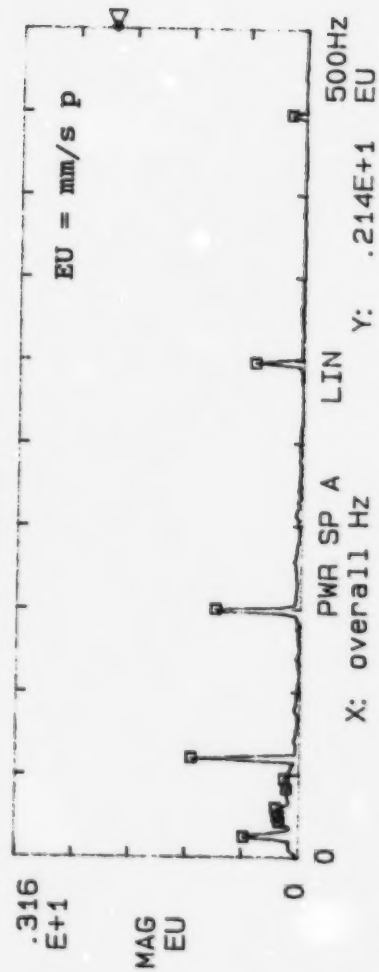
03:14

FIGURE A-81 : PUMPSET #14, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #14 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	50.00Hz	.121E+1	EU
2	150.00	.953E+0	
3	12.50	.622E+0	
4	298.75	.552E+0	
5	30.00	.262E+0	
6	25.00	.245E+0	
7	21.25	.221E+0	
8	47.50	.176E+0	
9	448.75	.173E+0	
10	41.25	.145E+0	

ABOVE PUMP BOWL > VERTICAL



02:41

FIGURE A-82 : PUMPSET #14, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #14 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB	EU
1	148.75Hz	.188E+1	EU
2	60.00	.950E+0	
3	21.25	.490E+0	
4	30.00	.413E+0	
5	13.75	.340E+0	
6	298.75	.275E+0	
7	45.00	.205E+0	
8	448.75	.190E+0	
9	53.75	.132E+0	
10	68.75	.110E+0	

ABOVE PUMP BOWL > N-S

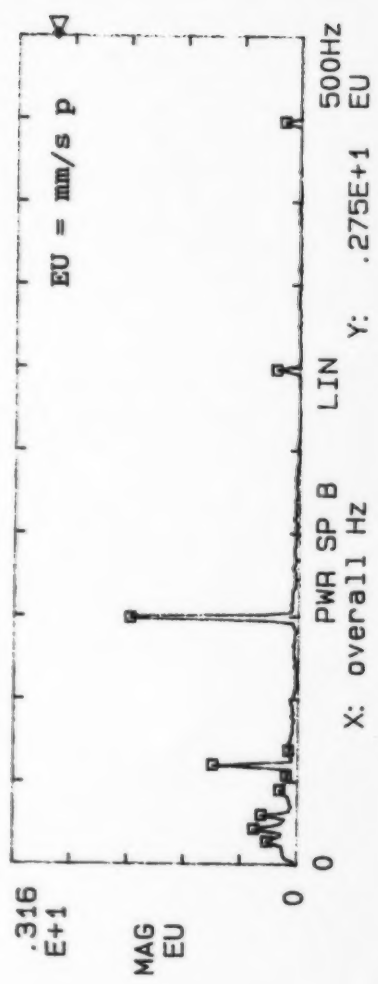


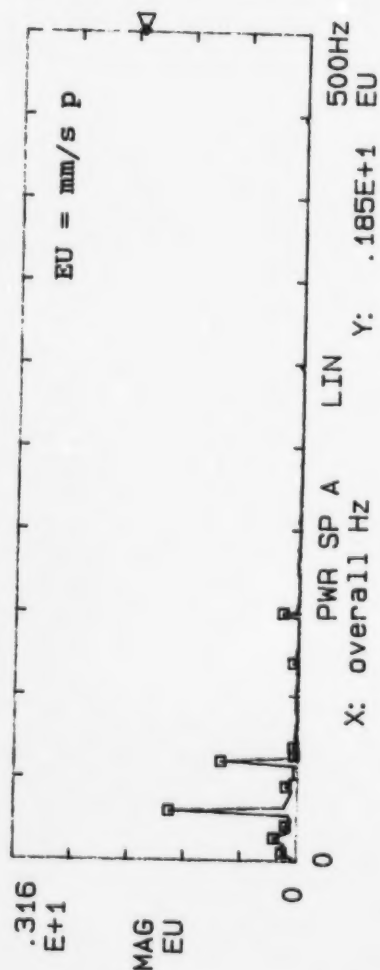
FIGURE A-83 : PUMPSET #14, VIBRATION SPECTRA ABOVE PUMP BOWL

02: 42

PICKERING A U1 P.H.T. PUMPSET #14 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	30.00Hz	.144E+1	EU
2	60.00	.867E+0	
3	13.75	.265E+0	
4	150.00	.188E+0	
5	5.00	.169E+0	
6	21.25	.137E+0	
7	45.00	.136E+0	
8	120.00	.669E-1	
9	68.75	.544E-1	
10	63.75	.399E-1	

ABOVE PUMP BOWL > E-W



03: 16

FIGURE A-84 : PUMPSET #14, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #15 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.125E+1	EU
2	13.75	.597E+0	
3	150.00	.533E+0	
4	25.00	.332E+0	
5	298.75	.290E+0	
6	20.00	.233E+0	
7	30.00	.221E+0	
8	240.00	.216E+0	
9	45.00	.178E+0	
10	225.00	.181E+0	

TOP OF MOTOR > VERTICAL

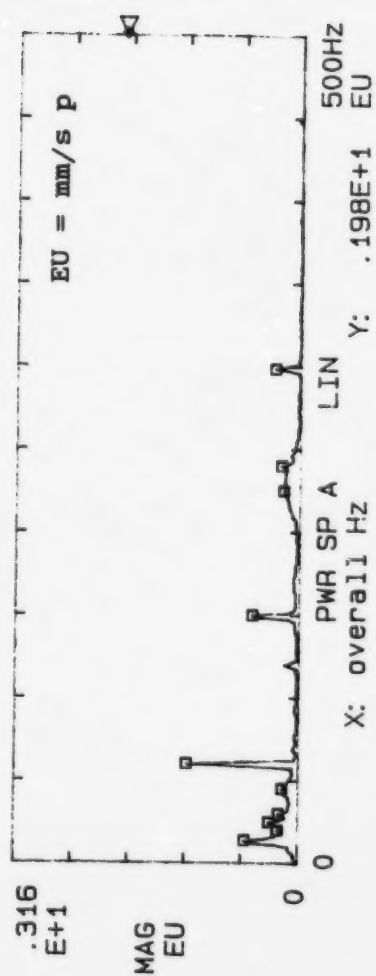


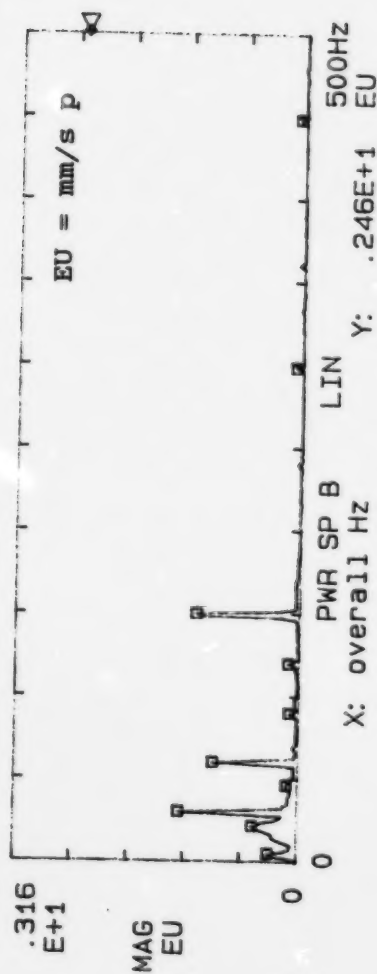
FIGURE A-85 : PUMPSET #15, VIBRATION SPECTRA AT TOP OF MOTOR

02: 44

PICKERING A U1 P.H.T. PUMPSET #15 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	EU
1	30.00Hz	.133E+1	
2	150.00	.117E+1	
3	60.00	.954E+0	
4	21.25	.509E+0	
5	5.00	.330E+0	
6	46.25	.132E+0	
7	120.00	.132E+0	
8	90.00	.113E+0	
9	298.75	.846E-1	
10	448.75	.758E-1	

TOP OF MOTOR > N-S



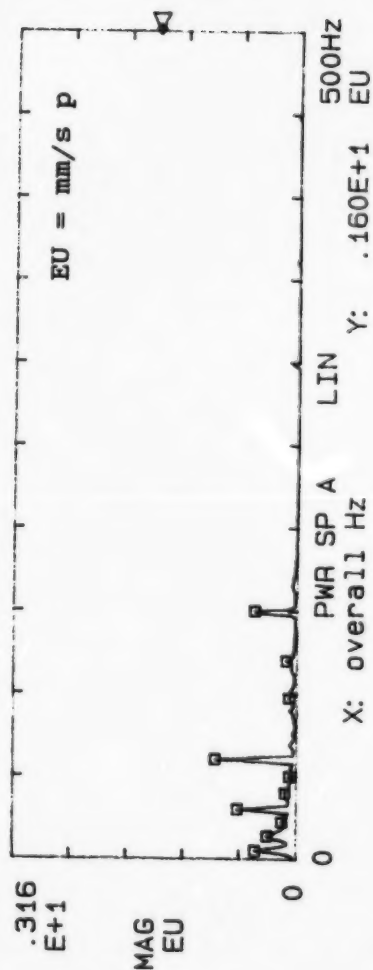
02: 46

FIGURE A-86 : PUMPSET #15, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #15 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA
1	60.00Hz	.909E+0 EU
2	30.00	.668E+0
3	150.00	.479E+0
4	5.00	.467E+0
5	13.75	.328E+0
6	22.50	.168E+0
7	40.00	.139E+0
8	120.00	.125E+0
9	97.50	.897E-1
10	50.00	.837E-1

TOP OF MOTOR > E-W



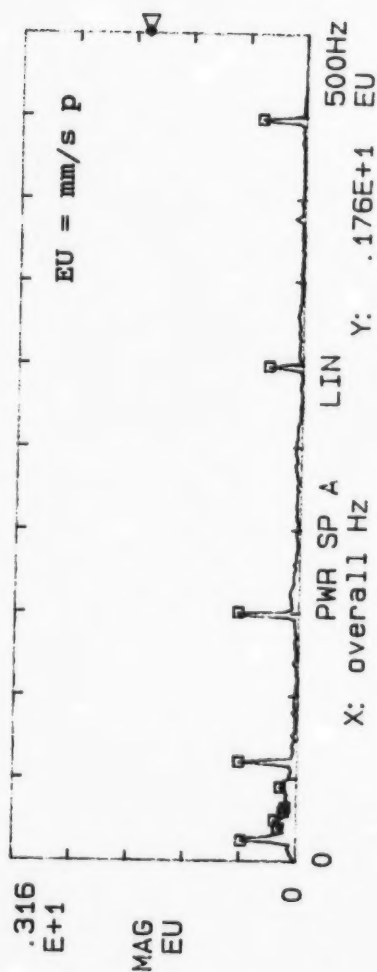
03: 19

FIGURE A-87 : PUMPSET #15, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #15 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	150.00Hz	.685E+0	EU
2	60.00	.661E+0	
3	12.50	.618E+0	
4	448.75	.491E+0	
5	298.75	.384E+0	
6	25.00	.253E+0	
7	20.00	.217E+0	
8	45.00	.194E+0	
9	30.00	.150E+0	
10	32.50	.133E+0	

ABOVE PUMP BOWL > VERTICAL



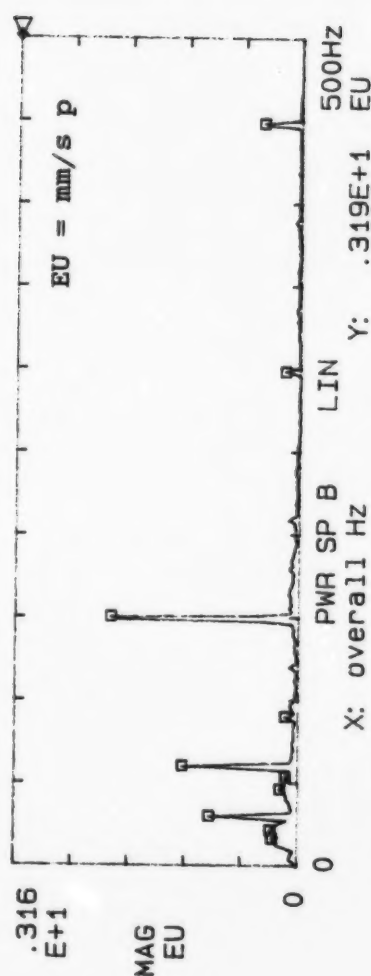
02:48

FIGURE A-88 : PUMPSET #15, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #15 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB	EU
1	150.00Hz	.210E+1	EU
2	60.00	.130E+1	
3	30.00	.996E+0	
4	448.75	.432E+0	
5	21.25	.309E+0	
6	16.25	.293E+0	
7	46.25	.201E+0	
8	298.75	.175E+0	
9	90.00	.150E+0	
10	53.75	.145E+0	

ABOVE PUMP BOWL > N-S



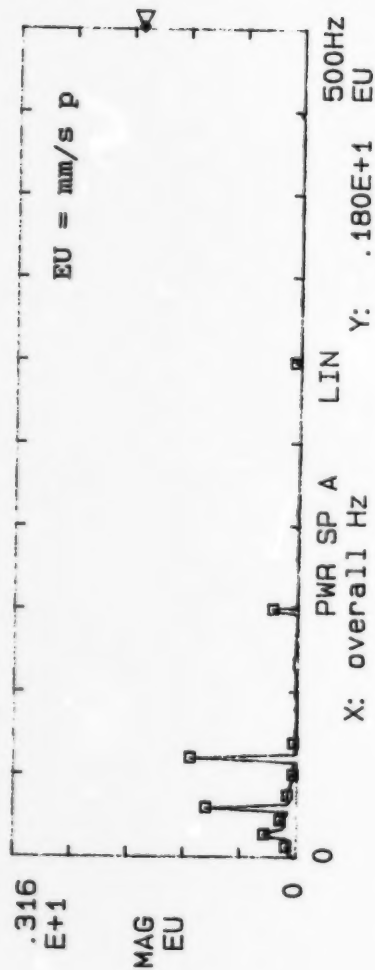
02: 49

FIGURE A-89 : PUMPSET #15, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #15 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	60.00Hz	.120E+1	EU
2	30.00	.102E+1	
3	13.75	.374E+0	
4	150.00	.292E+0	
5	22.50	.189E+0	
6	6.25	.121E+0	
7	37.50	.114E+0	
8	298.75	.626E-1	
9	50.00	.522E-1	
10	68.75	.513E-1	

ABOVE PUMP BOWL > E-W



03: 21

FIGURE A-90 : PUMPSET #15, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #16 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA
1	30.00Hz	.927E+0 EU
2	60.00	.646E+0
3	298.75	.615E+0
4	13.75	.432E+0
5	360.00	.375E+0
6	150.00	.362E+0
7	21.25	.301E+0
8	42.50	.194E+0
9	120.00	.136E+0
10	448.75	.131E+0

TOP OF MOTOR > VERTICAL

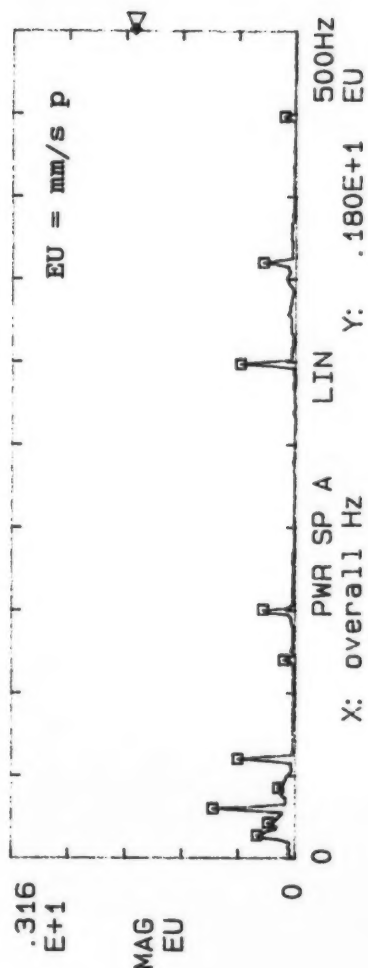


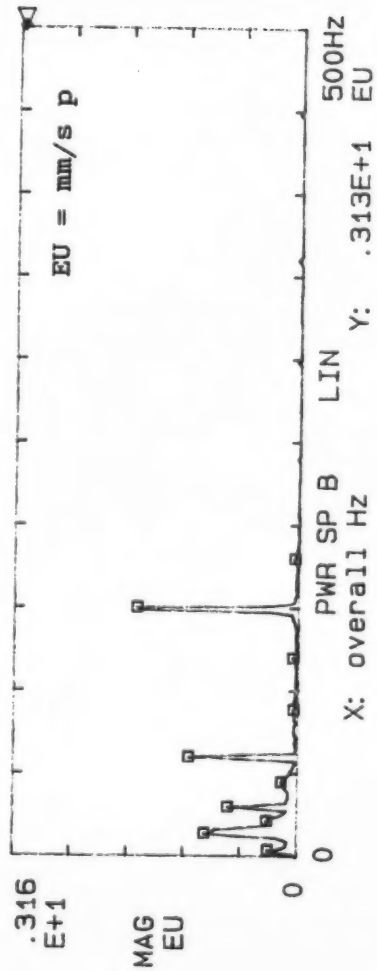
FIGURE A-91 : PUMPSET #16, VIBRATION SPECTRA AT TOP OF MOTOR

02:52

PICKERING A U1 P.H.T. PUMPSET #16 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	
1	150.00Hz	.181E+1	EU
2	60.00	.123E+1	
3	13.75	.104E+1	
4	30.00	.771E+0	
5	21.25	.341E+0	
6	3.75	.335E+0	
7	45.00	.182E+0	
8	120.00	.630E-1	
9	88.75	.505E-1	
10	180.00	.575E-1	

TOP OF MOTOR > N-S



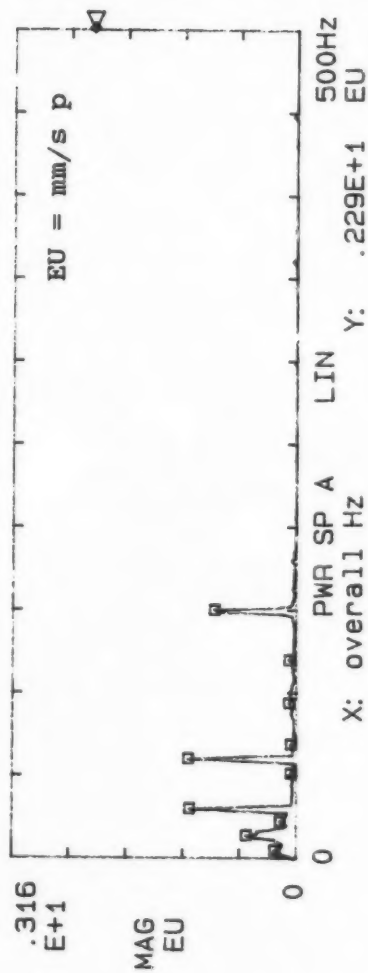
02:53

FIGURE A-92 : PUMPSET #16, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #16 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.121E+1	EU
2	30.00	.121E+1	
3	150.00	.927E+0	
4	13.75	.559E+0	
5	5.00	.242E+0	
6	22.50	.180E+0	
7	93.75	.822E-1	
8	120.00	.853E-1	
9	51.25	.606E-1	
10	68.75	.602E-1	

TOP OF MOTOR > E-W



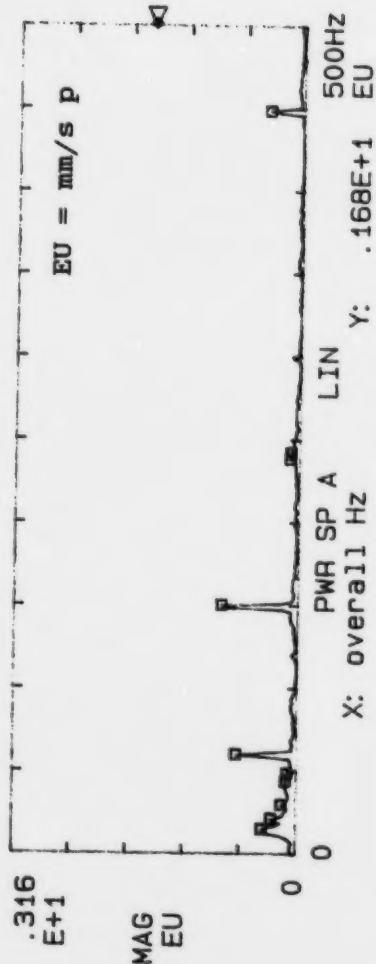
03: 23

FIGURE A-93 : PUMPSET #16, VIBRATION SPECTRA AT TOP OF MOTOR

PICKERING A U1 P.H.T. PUMPSET #16 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	150.00Hz	.857E+0	EU
2	60.00	.690E+0	
3	15.00	.388E+0	
4	448.75	.383E+0	
5	21.25	.282E+0	
6	30.00	.178E+0	
7	43.75	.122E+0	
8	48.75	.116E+0	
9	238.75	.113E+0	
10	242.50	.103E+0	

ABOVE PUMP BOWL > VERTICAL



02:55

FIGURE A-94 : PUMPSET #16, VIBRATION SPECTRA ABOVE PUMP BOWL

PICKERING A U1 P.H.T. PUMPSET #16 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	EU
1	150.00Hz	.215E+1	EU
2	60.00	.126E+1	
3	30.00	.777E+0	
4	13.75	.460E+0	
5	16.25	.453E+0	
6	22.50	.284E+0	
7	448.75	.242E+0	
8	43.75	.234E+0	
9	3.75	.154E+0	
10	90.00	.146E+0	

ABOVE PUMP BOWL > N-S

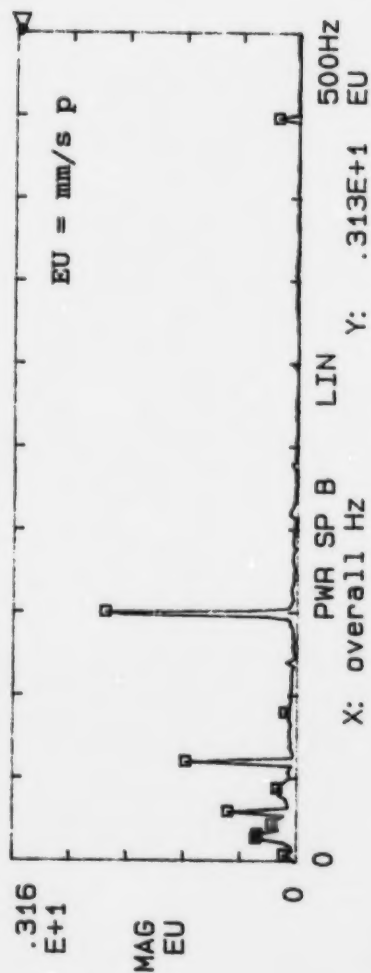


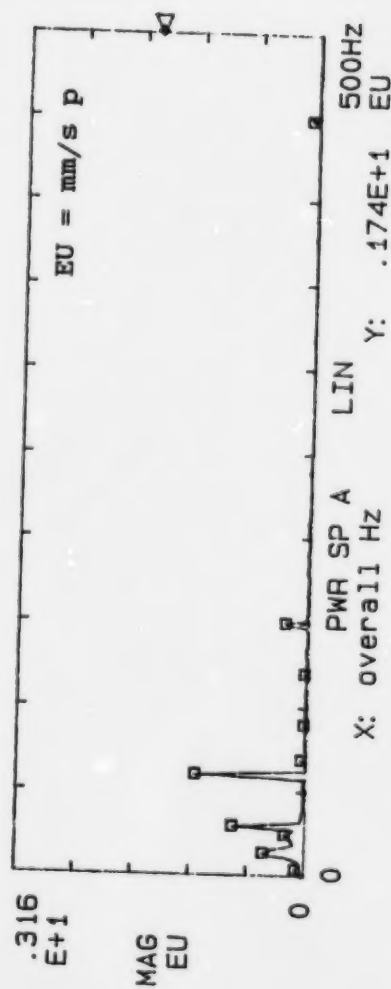
FIGURE A-95 : PUMPSET #16, VIBRATION SPECTRA ABOVE PUMP BOWL

02:57

PICKERING A U1 P.H.T. PUMPSET #16 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	60.00Hz	.122E+1	EU
2	30.00	.808E+0	
3	13.75	.463E+0	
4	150.00	.259E+0	
5	25.00	.232E+0	
6	3.75	.107E+0	
7	448.75	.837E-1	
8	68.75	.664E-1	
9	90.00	.432E-1	
10	120.00	.441E-1	

ABOVE PUMP BOWL > E-W



03:25

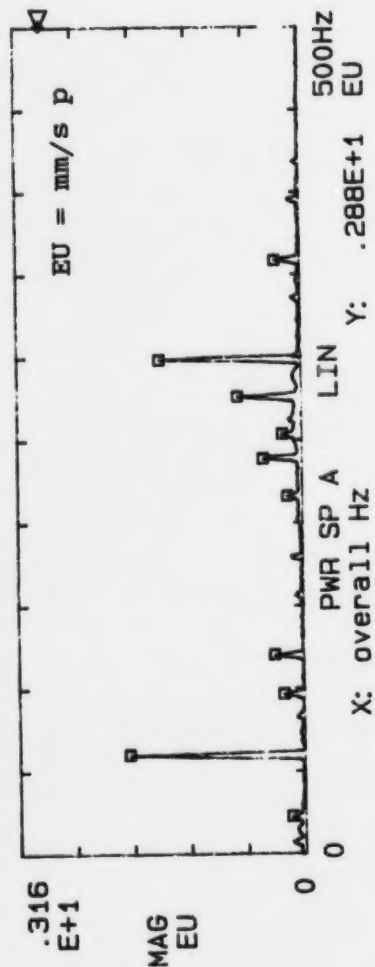
FIGURE A-96 : PUMPSET #16, VIBRATION SPECTRA ABOVE PUMP BOWL

Appendix B. PHT Pressurizing Pumpset Vibration Spectra

PICKERING A U1 PRESSURIZING PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	60.00Hz	.195E+1	EU
2	298.75	.159E+1	
3	276.25	.721E+0	
4	238.75	.439E+0	
5	120.00	.335E+0	
6	358.75	.295E+0	
7	96.25	.231E+0	
8	253.75	.220E+0	
9	216.25	.175E+0	
10	22.50	.152E+0	

TOP OF MOTOR > VERTICAL

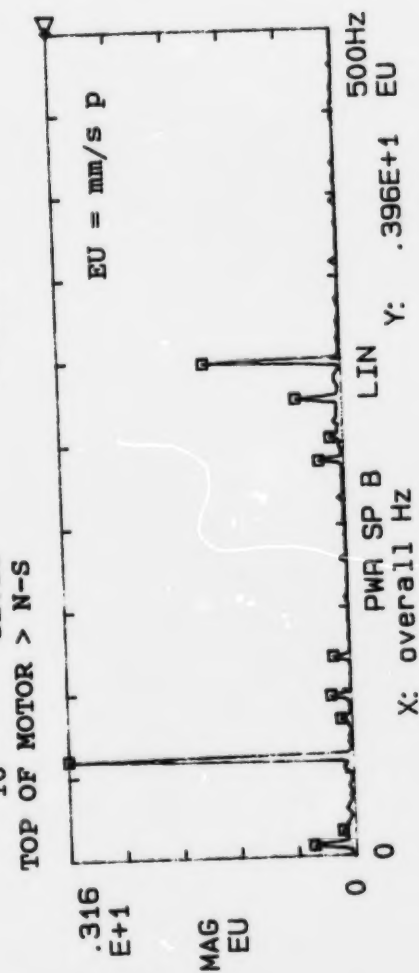


04:37

FIGURE B-1 : PUMPSET #1, VIBRATION SPECTRA, TOP OF MOTOR

PICKERING A U1 PRESSURIZING PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	EU
1	60.00Hz	.340E+1	
2	298.75	.155E+1	
3	276.25	.529E+0	
4	6.25	.466E+0	
5	238.75	.278E+0	
6	96.25	.235E+0	
7	120.00	.189E+0	
8	252.50	.149E+0	
9	15.00	.144E+0	
10	82.50	.130E+0	



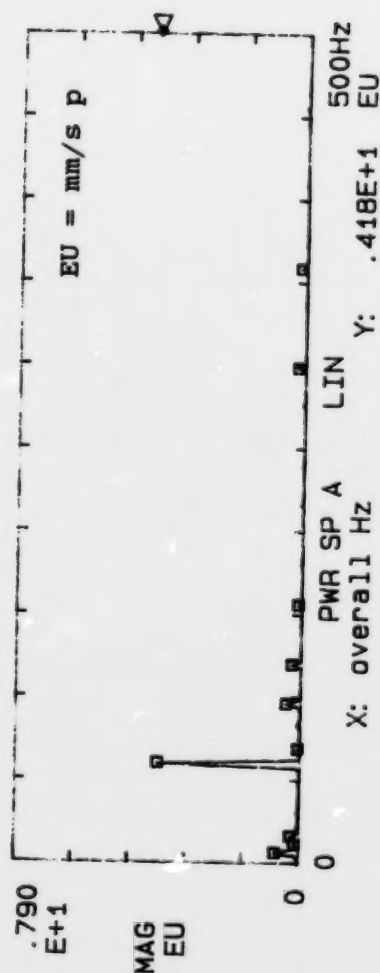
04:38

FIGURE B-2 : PUMPAET #1, VIBRATION SPECTRA, TOP OF MOTOR

PICKERING A U1 PRESSURIZING PUMPSET #1 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA
1	60.00Hz	.398E+1 EU
2	6.25	.670E+0
3	96.25	.419E+0
4	16.25	.251E+0
5	120.00	.252E+0
6	298.75	.222E+0
7	358.75	.150E+0
8	11.25	.126E+0
9	156.25	.101E+0
10	68.75	.846E-1

TOP OF MOTOR > E-W



05:25

FIGURE B-3 : PUMPSET #1, VIBRATION SPECTRA, TOP OF MOTOR

PICKERING A U1 PRESSURIZING PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	60.00Hz	.722E+0	EU
2	298.75	.133E+0	
3	22.50	.124E+0	
4	6.25	.115E+0	
5	455.00	.114E+0	
6	120.00	.108E+0	
7	465.00	.105E+0	
8	461.25	.997E-1	
9	448.75	.954E-1	
10	478.75	.925E-1	

ABOVE PUMP BOWL > VERTICAL

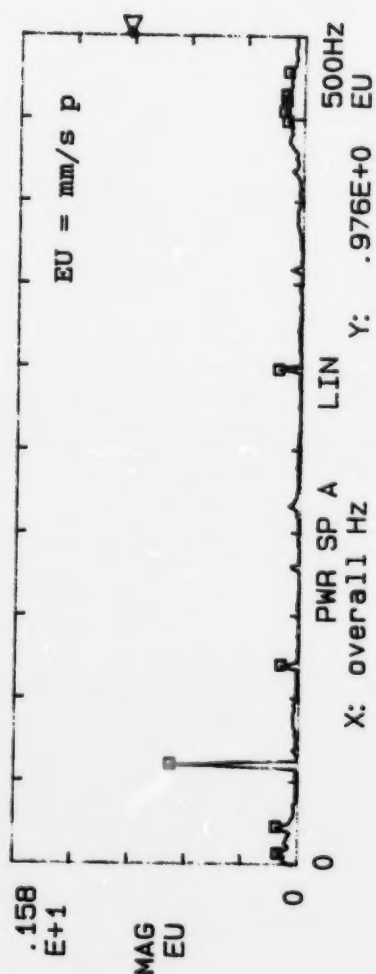


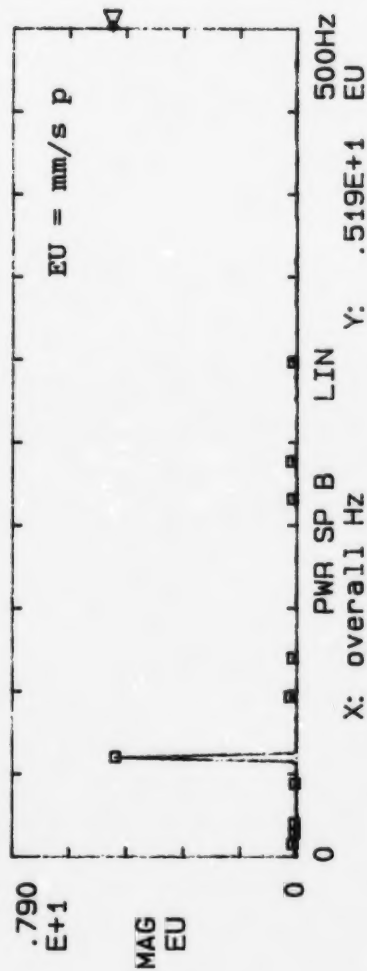
FIGURE B-4 : PUMPSET #1, VIBRATION SPECTRA, ABOVE PUMP BOWL

04: 42

PICKERING A U1 PRESSURIZING PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB	EU
1	60.00Hz	.508E+1	EU
2	96.25	.206E+0	
3	238.75	.155E+0	
4	7.50	.144E+0	
5	120.00	.123E+0	
6	216.25	.133E+0	
7	298.75	.145E+0	
8	13.75	.900E-1	
9	20.00	.918E-1	
10	43.75	.604E-1	

ABOVE PUMP BOWL > N-S



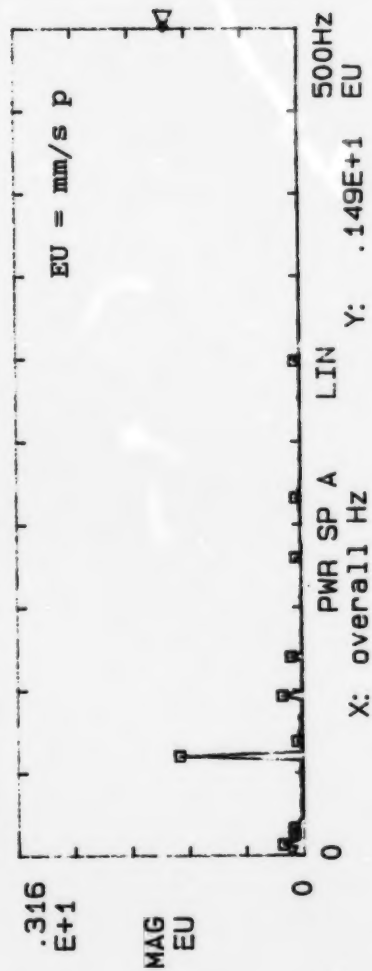
04:41

FIGURE B-5 : PUMPSET #1, VIBRATION SPECTRA, ABOVE PUMP BOWL

PICKERING A U1 PRESSURIZING PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	60.00Hz	.138E+1	EU
2	6.25	.228E+0	
3	96.25	.236E+0	
4	120.00	.136E+0	
5	16.25	.112E+0	
6	12.50	.103E+0	
7	68.75	.786E-1	
8	180.00	.782E-1	
9	216.25	.651E-1	
10	298.75	.645E-1	

ABOVE PUMP BOWL > E-W



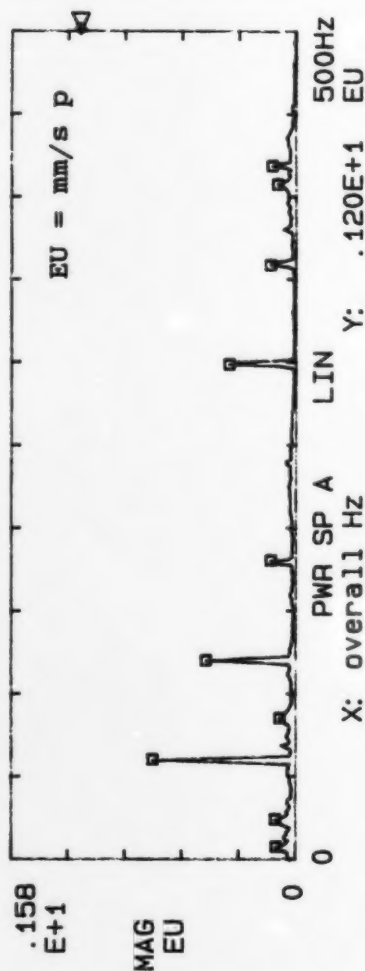
05:28

FIGURE B-6 : PUMPSET #1, VIBRATION SPECTRA, ABOVE PUMP BOWL

PICKERING A U1 PRESSURIZING PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	60.00Hz	.796E+0	EU
2	120.00	.503E+0	
3	298.75	.374E+0	
4	358.75	.148E+0	
5	180.00	.141E+0	
6	418.75	.134E+0	
7	23.75	.118E+0	
8	7.50	.110E+0	
9	407.50	.104E+0	
10	85.00	.935E-1	

TOP OF MOTOR > VERTICAL



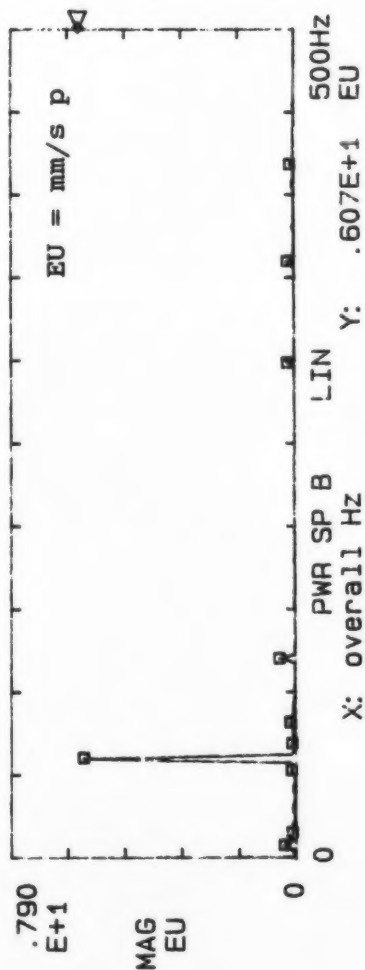
04: 44

FIGURE B-7 : PUMPSET #1, VIBRATION SPECTRA, TOP OF MOTOR

PICKERING A U1 PRESSURIZING PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	
1	60.00Hz	.592E+1	EU
2	120.00	.445E+0	
3	7.50	.344E+0	
4	298.75	.203E+0	
5	360.00	.208E+0	
6	81.25	.149E+0	
7	52.50	.133E+0	
8	418.75	.131E+0	
9	15.00	.113E+0	
10	68.75	.112E+0	

TOP OF MOTOR > N-S



04: 45

FIGURE B-8 : PUMPAET #1, VIBRATION SPECTRA, TOP OF MOTOR

PICKERING A U1 PRESSURIZING PUMPSET #2 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA
1	60.00Hz	.420E+1 EU
2	6.25	.668E+0
3	120.00	.324E+0
4	16.25	.219E+0
5	86.25	.216E+0
6	298.75	.160E+0
7	11.25	.136E+0
8	21.25	.118E+0
9	68.75	.896E-1
10	25.00	.511E-1

TOP OF MOTOR > E-W

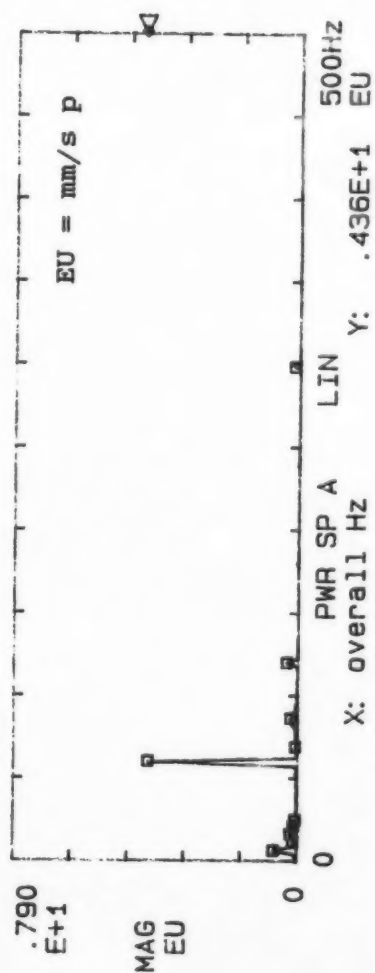


FIGURE B-9 : PUMPSET #1, VIBRATION SPECTRA, TOP OF MOTOR

05: 30

PICKERING A U1 PRESSURIZING PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	60.00Hz	.701E+0	EU
2	298.75	.224E+0	
3	6.25	.183E+0	
4	418.75	.109E+0	
5	23.75	.973E-1	
6	68.75	.929E-1	
7	433.75	.912E-1	
8	423.75	.796E-1	
9	426.25	.818E-1	
10	428.75	.792E-1	

ABOVE PUMP BOWL > VERTICAL

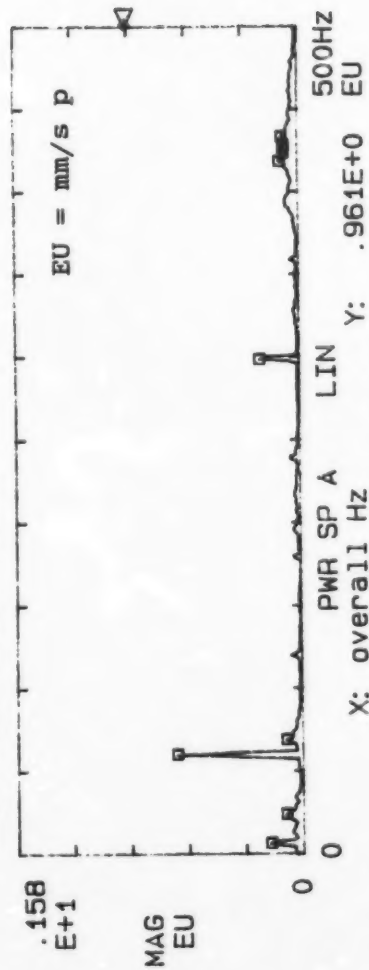


FIGURE B-10 : PUMPSET #1, VIBRATION SPECTRA, ABOVE PUMP BOWL

04: 48

PICKERING A U1 PRESSURIZING PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	
1	60.00Hz	.267E+1	EU
2	120.00	.244E+0	
3	298.75	.167E+0	
4	240.00	.111E+0	
5	7.50	.109E+0	
6	15.00	.797E-1	
7	20.00	.795E-1	
8	68.75	.787E-1	
9	360.00	.599E-1	
10	48.75	.500E-1	

ABOVE PUMP BOWL > N-S

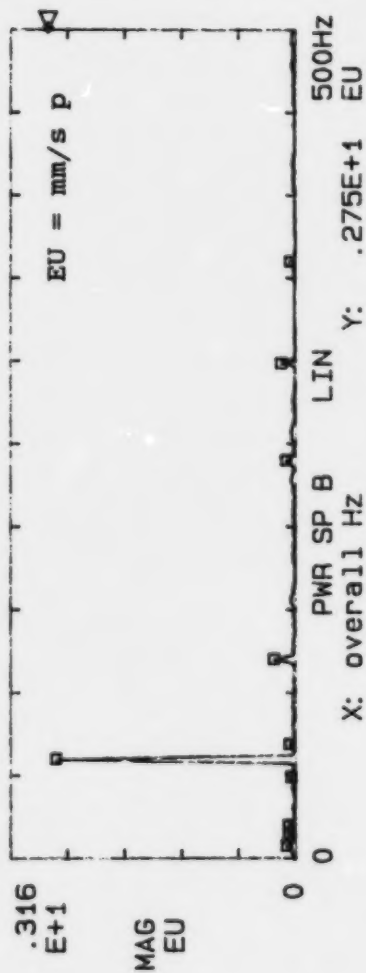


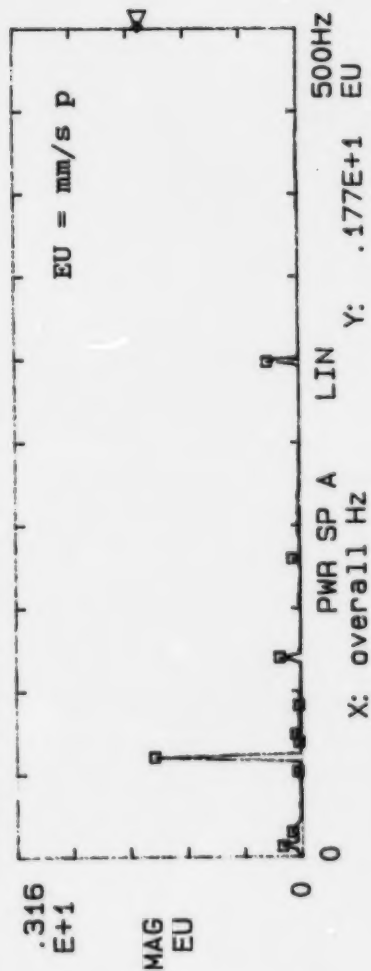
FIGURE B-11 : PUMPSET #1, VIBRATION SPECTRA, ABOVE PUMP BOWL

04: 49

PICKERING A U1 PRESSURIZING PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.164E+1	EU
2	298.75	.359E+0	
3	120.00	.239E+0	
4	6.25	.225E+0	
5	15.00	.113E+0	
6	180.00	.919E-1	
7	73.75	.665E-1	
8	51.25	.429E-1	
9	68.75	.365E-1	
10	91.25	.308E-1	

ABOVE PUMP BOWL > E-W



05:32

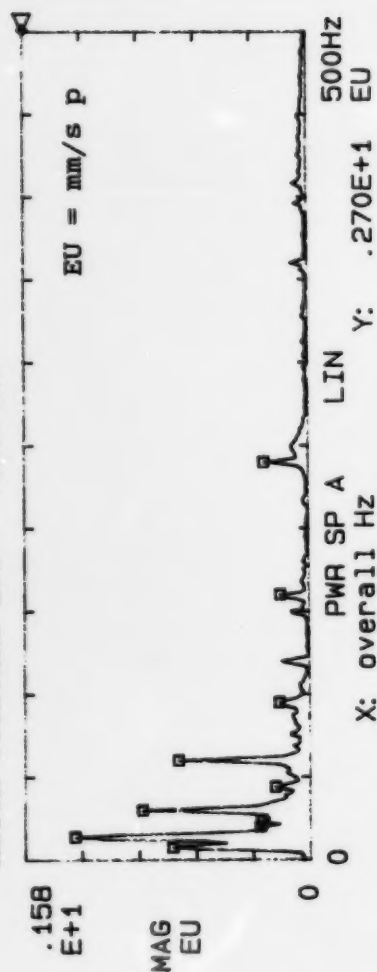
FIGURE B-12 : PUMPSET #1, VIBRATION SPECTRA, ABOVE PUMP BOWL

Appendix C. PHT Shut Down Cooling Pumpset Vibration Spectra

PICKERING A U1 SHUTDOWN COOLING PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	EU
1	13.75Hz	.131E+1	EU
2	30.00	.938E+0	
3	7.50	.769E+0	
4	60.00	.735E+0	
5	20.00	.281E+0	
6	23.75	.270E+0	
7	240.00	.250E+0	
8	43.75	.193E+0	
9	95.00	.170E+0	
10	160.00	.163E+0	

MOTOR OUTBOARD END > VERTICAL



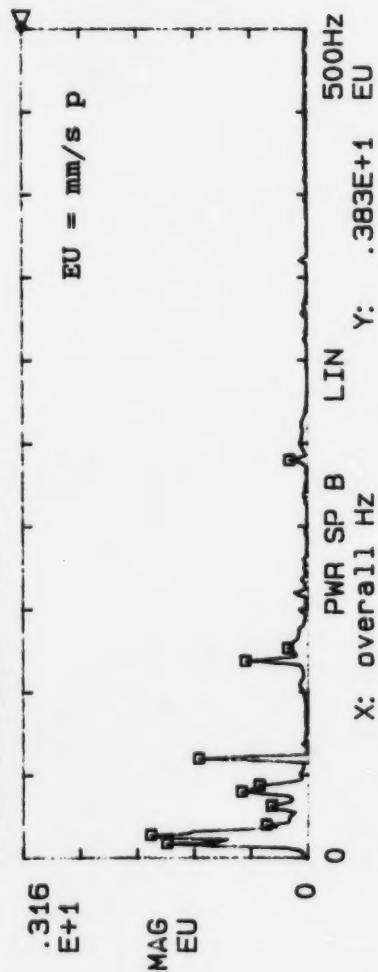
05:00

FIGURE C-1 : PUMPSET #1, VIBRATION SPECTRA, MOTOR OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #1 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB	EU
1	13.75Hz		.176E+1
2	8.75		.158E+1
3	60.00		.122E+1
4	40.00		.749E+0
5	118.75		.701E+0
6	43.75		.553E+0
7	20.00		.469E+0
8	31.25		.412E+0
9	126.25		.221E+0
10	240.00		.200E+0

MOTOR OUTBOARD END > N-S



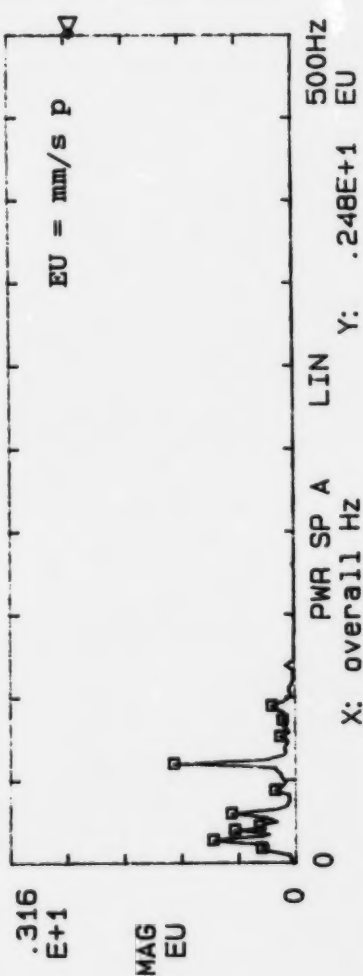
05: 01

FIGURE C-2 : PUMPSET #1, VIBRATION SPECTRA, MOTOR OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	EU
1	60.00Hz	.136E+1	EU
2	13.75	.926E+0	
3	30.00	.713E+0	
4	20.00	.688E+0	
5	22.50	.399E+0	
6	8.75	.382E+0	
7	95.00	.260E+0	
8	43.75	.230E+0	
9	76.25	.169E+0	
10	86.25	.139E+0	

MOTOR OUTBOARD END > E-W



05: 39

FIGURE C-3 : PUMPSET #1, VIBRATION SPECTRA, MOTOR OUTBOARD BEARING

	PWR SPECTRUM	ChA	EU
1	60.00Hz	.746E+0	
2	12.50	.565E+0	
3	7.50	.499E+0	
4	22.50	.268E+0	
5	20.00	.234E+0	
6	30.00	.208E+0	
7	41.25	.199E+0	
8	277.50	.187E+0	
9	55.00	.174E+0	
10	118.75	.177E+0	

PUMP INBOARD END > VERTICAL

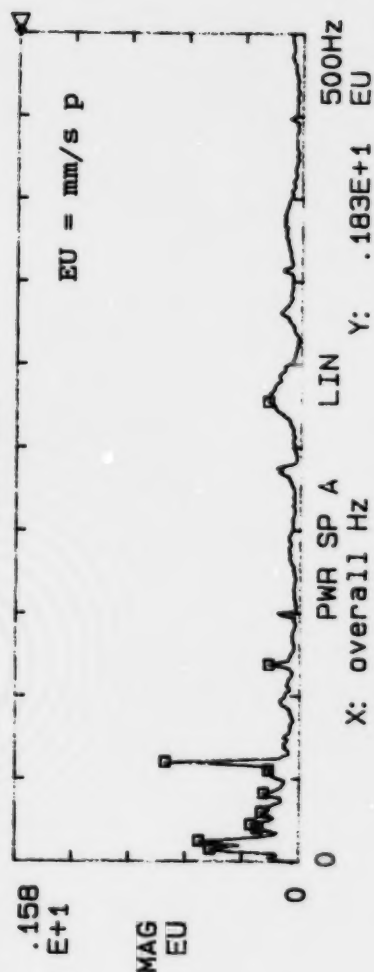
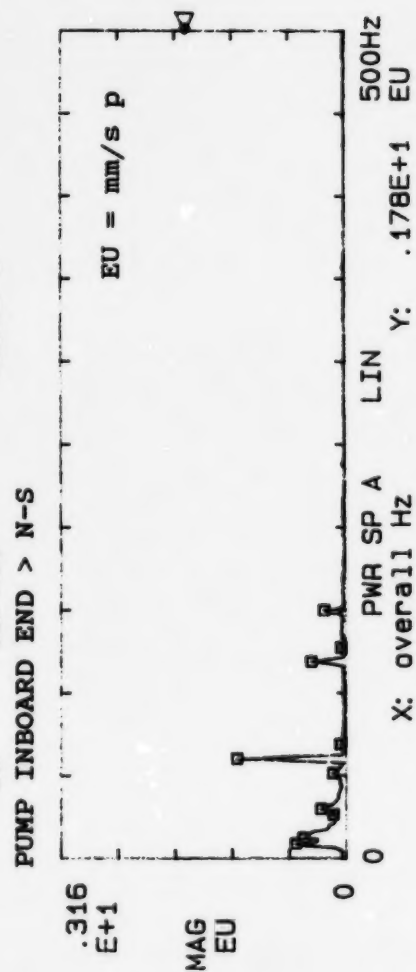


FIGURE C-4 : PUMPSET #1, VIBRATION SPECTRA, PUMP INBOARD BEARING

05:10

PICKERING A U1 SHUTDOWN COOLING PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	60.00Hz	.122E+1	EU
2	8.75	.566E+0	
3	12.50	.476E+0	
4	118.75	.387E+0	
5	30.00	.283E+0	
6	150.00	.242E+0	
7	51.25	.151E+0	
8	26.25	.145E+0	
9	68.75	.621E-1	
10	127.50	.505E-1	



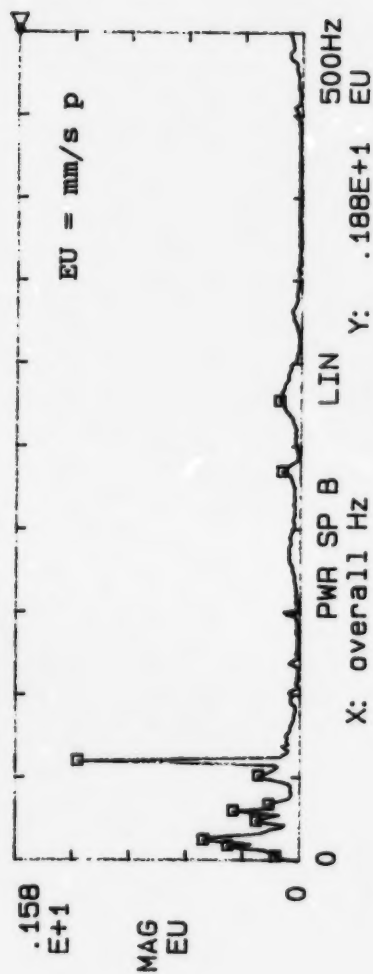
05:37

FIGURE C-5 : PUMPSET #1, VIBRATION SPECTRA, PUMP INBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #1 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB
1	60.00Hz	.124E+1 EU
2	12.50	.540E+0
3	8.75	.403E+0
4	30.00	.371E+0
5	23.75	.243E+0
6	51.25	.237E+0
7	33.75	.178E+0
8	2.50	.135E+0
9	277.50	.120E+0
10	235.00	.105E+0

PUMP INBOARD END > E-W

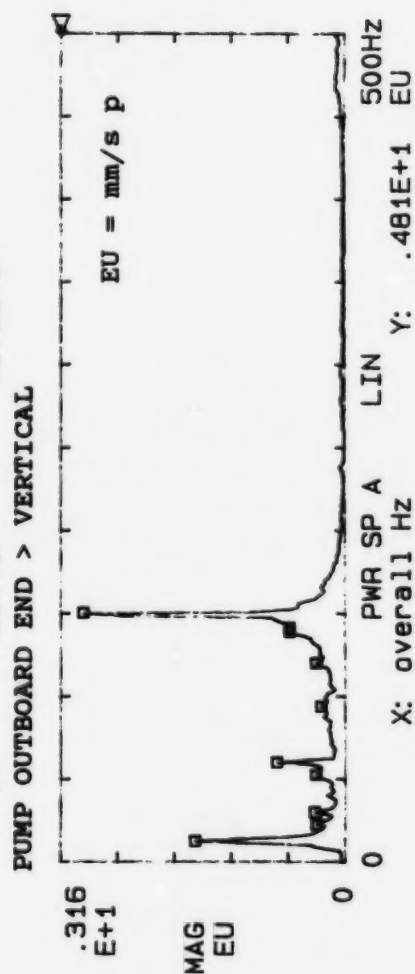


05:09

FIGURE C-6 : PUMPSET #1, VIBRATION SPECTRA, PUMP INBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #1 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	150.00Hz	.293E+1	EU
2	12.50	.167E+1	
3	60.00	.762E+0	
4	141.25	.629E+0	
5	138.75	.622E+0	
6	30.00	.337E+0	
7	52.50	.330E+0	
8	120.00	.334E+0	
9	22.50	.325E+0	
10	93.75	.273E+0	

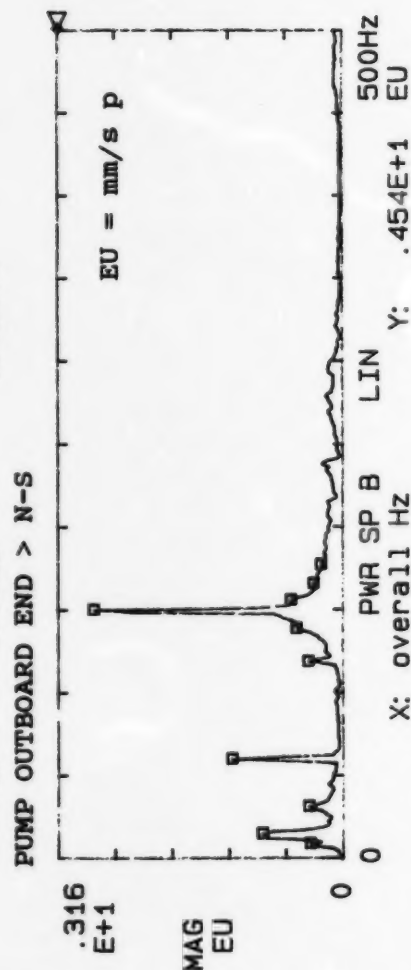


05: 04

FIGURE C-7 : PUMPSET #1, VIBRATION SPECTRA, PUMP OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB	EU
1	150.00Hz	.277E+1	EU
2	60.00	.124E+1	
3	15.00	.899E+0	
4	156.25	.578E+0	
5	138.75	.522E+0	
6	118.75	.391E+0	
7	31.25	.384E+0	
8	8.75	.369E+0	
9	166.25	.336E+0	
10	177.50	.240E+0	



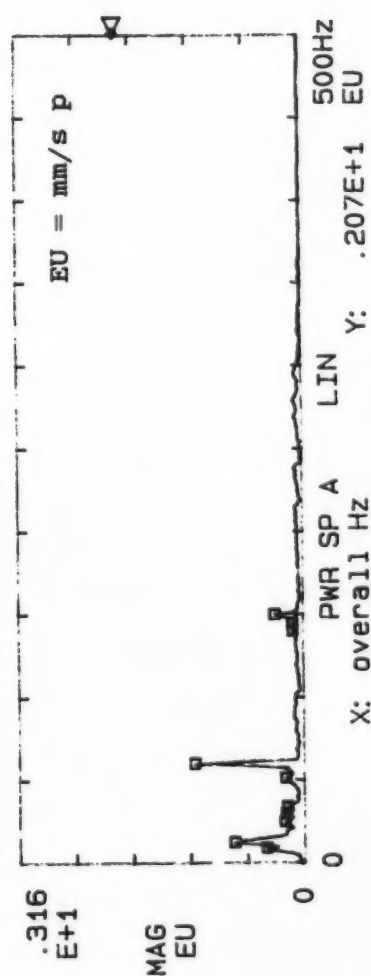
05:05

FIGURE C-8 : PUMPSET #1, VIBRATION SPECTRA, PUMP OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #1 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR	SPECTRUM	ChA	
1	60.00Hz		.122E+1	EU
2	12.50		.788E+0	
3	8.75		.433E+0	
4	150.00		.321E+0	
5	25.00		.222E+0	
6	51.25		.217E+0	
7	30.00		.201E+0	
8	33.75		.188E+0	
9	140.00		.122E+0	
10	145.00		.119E+0	

PUMP OUTBOARD END > E-W

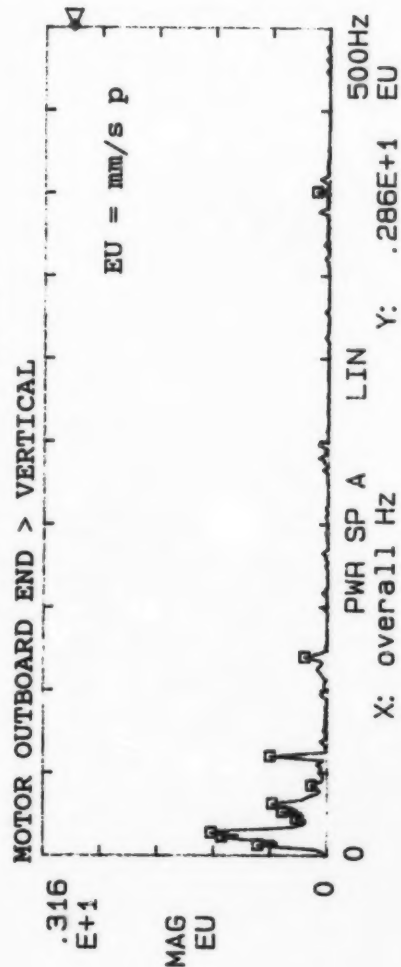


05:34

FIGURE C-9 : PUMPSET #1, VIBRATION SPECTRA, PUMP OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #2 (EU=MM/S PK
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	EU
1	13.75Hz	.130E+1	
2	11.25	.118E+1	
3	6.25	.775E+0	
4	60.00	.648E+0	
5	31.25	.621E+0	
6	26.25	.508E+0	
7	22.50	.354E+0	
8	120.00	.266E+0	
9	42.50	.178E+0	
10	401.25	.141E+0	



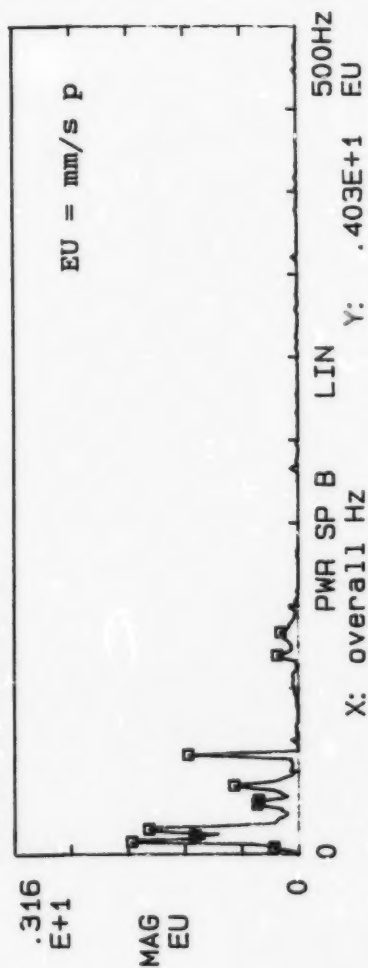
03: 58

FIGURE C-10 : PUMPSET #1, VIBRATION SPECTRA, MOTOR OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #2 (EU=MM/S PK
500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTHUM	ChB	EU
1	7.50Hz	.187E+1	
2	15.00	.167E+1	
3	60.00	.123E+1	
4	11.25	.116E+1	
5	41.25	.731E+0	
6	30.00	.471E+0	
7	32.50	.454E+0	
8	3.75	.278E+0	
9	120.00	.243E+0	
10	133.75	.206E+0	

MOTOR OUTBOARD END > N-S



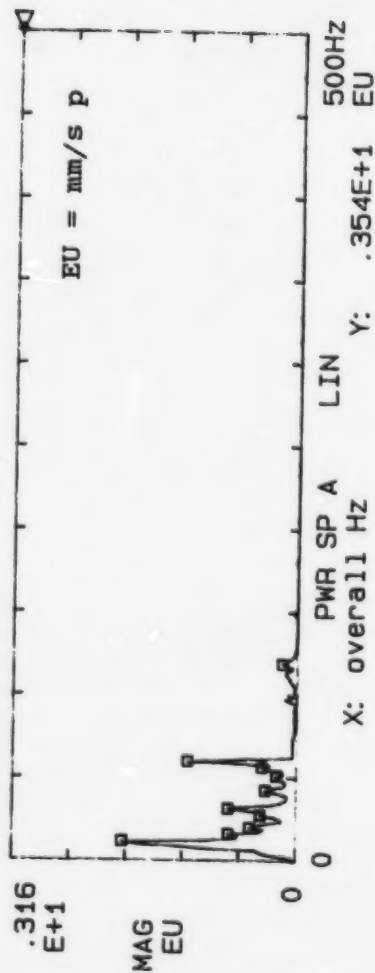
03: 58

FIGURE C-11 : PUMPSET #1, VIBRATION SPECTRA, MOTOR OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	11.25Hz	.194E+1	EU
2	60.00	.123E+1	
3	31.25	.767E+0	
4	16.25	.756E+0	
5	20.00	.517E+0	
6	27.50	.396E+0	
7	56.25	.390E+0	
8	42.50	.349E+0	
9	51.25	.218E+0	
10	118.75	.170E+0	

MOTOR OUTBOARD END > E-W



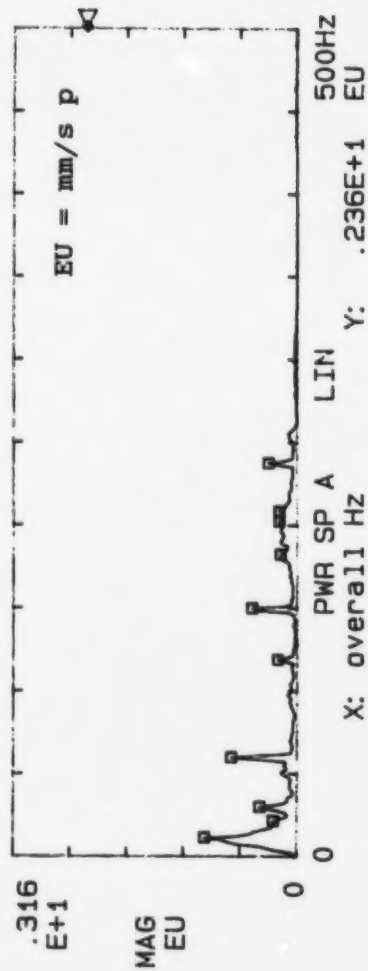
00:07

FIGURE C-12 : PUMPSET #1, VIBRATION SPECTRA, MOTOR OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #2 (EU=MM/S PK
500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	11.25Hz	.103E+1	EU
2	60.00	.736E+0	
3	150.00	.510E+0	
4	30.00	.425E+0	
5	237.50	.326E+0	
6	21.25	.270E+0	
7	118.75	.222E+0	
8	202.50	.198E+0	
9	208.75	.203E+0	
10	182.50	.196E+0	

PUMP INBOARD END > VERTICAL



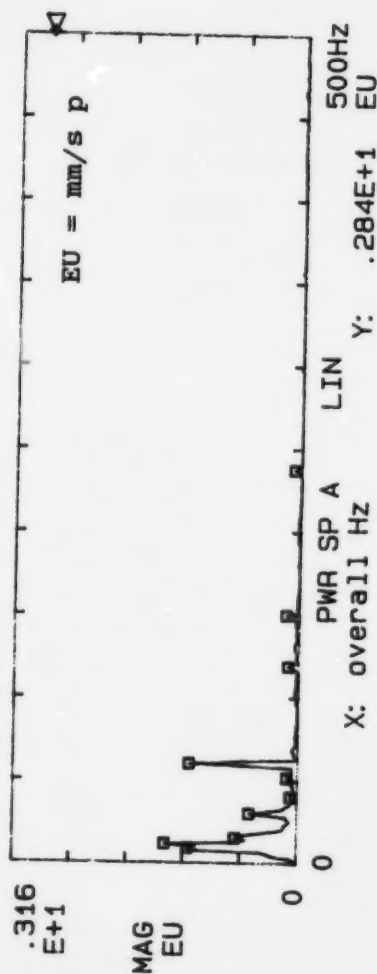
03:55

FIGURE C-13 : PUMPSET #1, VIBRATION SPECTRA, PUMP INBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	11.25Hz	.148E+1	EU
2	8.75	.122E+1	
3	60.00	.121E+1	
4	15.00	.703E+0	
5	30.00	.539E+0	
6	150.00	.154E+0	
7	51.25	.122E+0	
8	118.75	.122E+0	
9	40.00	.809E-1	
10	237.50	.804E-1	

PUMP INBOARD END > N-S



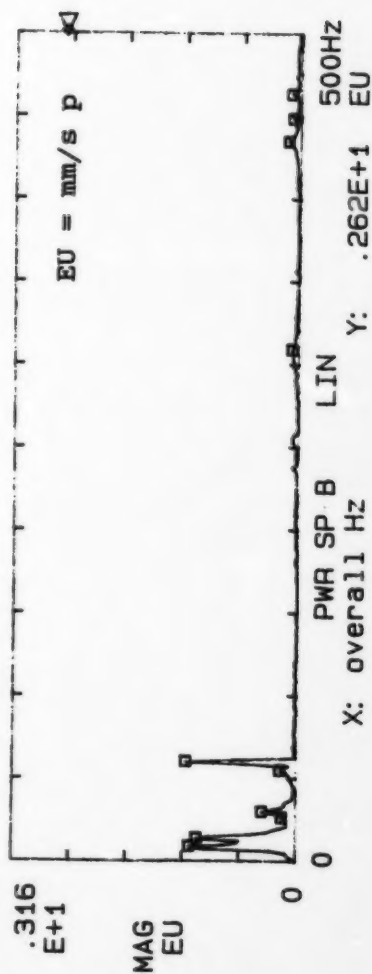
00:06

FIGURE C-14 : PUMPSET #1, VIBRATION SPECTRA, PUMP INBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #2 (EU=MM/S PK
500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB
1	60.00Hz	.124E+1 EU
2	8.75	.120E+1
3	13.75	.111E+1
4	30.00	.389E+0
5	55.00	.195E+0
6	26.25	.164E+0
7	435.00	.145E+0
8	463.75	.116E+0
9	448.75	.940E-1
10	308.75	.810E-1

PUMP INBOARD END > E-W



03: 56

FIGURE C-15 : PUMPSET #1, VIBRATION SPECTRA, PUMP INBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #2 (EU=MM/S PK
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	12.50Hz	.916E+0	EU
2	60.00	.733E+0	
3	22.50	.384E+0	
4	18.75	.307E+0	
5	32.50	.281E+0	
6	55.00	.268E+0	
7	28.75	.253E+0	
8	51.25	.248E+0	
9	290.00	.226E+0	
10	42.50	.188E+0	

PUMP OUTBOARD END > VERTICAL

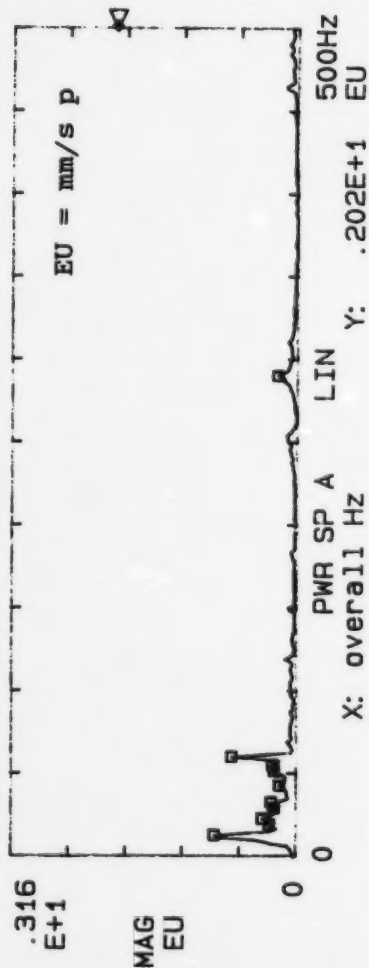


FIGURE C-16 : PUMPSET #1, VIBRATION SPECTRA, PUMP OUTBOARD BEARING

03:52

PICKERING A U1 SHUTDOWN COOLING PUMPSET #2 (EU=MM/S PK
500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB
1	60.00Hz	.124E+1 EU
2	13.75	.888E+0
3	16.25	.582E+0
4	30.00	.546E+0
5	465.00	.494E+0
6	7.50	.283E+0
7	490.00	.239E+0
8	485.00	.175E+0
9	150.00	.167E+0
10	40.00	.148E+0

PUMP OUTBOARD END > N-S

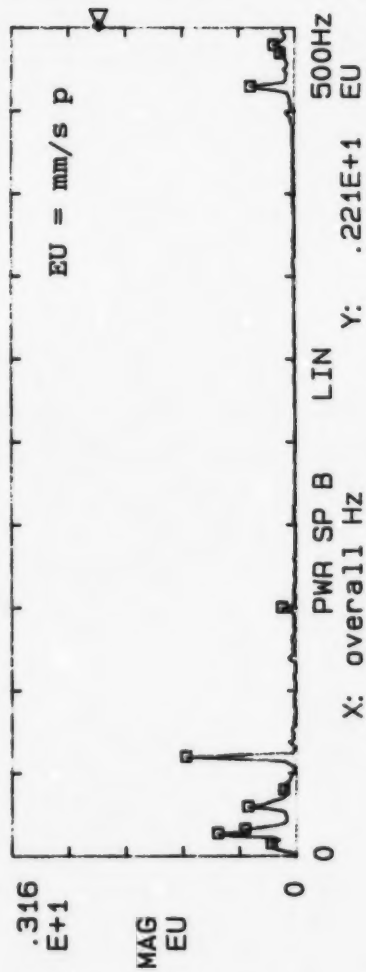


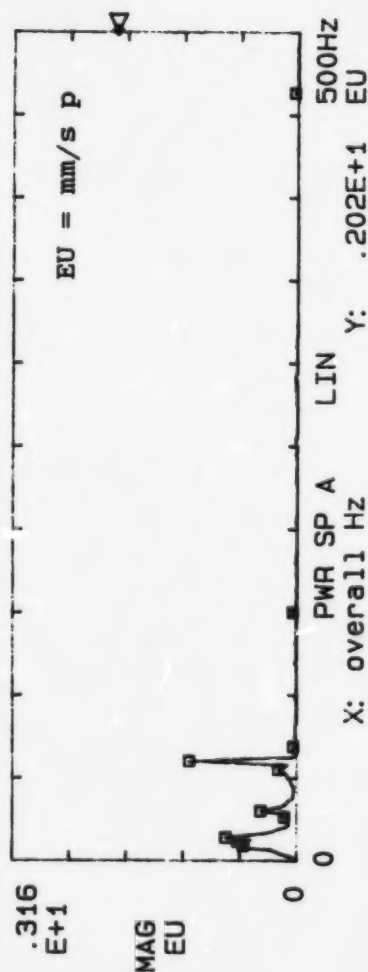
FIGURE C-17 : PUMPSET #1, VIBRATION SPECTRA, PUMP OUTBOARD BEARING

00:54

PICKERING A U1 SHUTDOWN COOLING PUMPSET #2 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	60.00Hz	.121E+1	EU
2	13.75	.791E+0	
3	11.25	.672E+0	
4	8.75	.601E+0	
5	30.00	.412E+0	
6	55.00	.213E+0	
7	26.25	.146E+0	
8	150.00	.591E-1	
9	68.75	.413E-1	
10	463.75	.400E-1	

PUMP OUTBOARD END > E-W



00:03

FIGURE C-18 : PUMPSET #1, VIBRATION SPECTRA, PUMP OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #3 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	13.75Hz	.155E+1	EU
2	8.75	.948E+0	
3	33.75	.943E+0	
4	360.00	.885E+0	
5	20.00	.854E+0	
6	38.75	.810E+0	
7	60.00	.659E+0	
8	23.75	.508E+0	
9	298.75	.241E+0	
10	43.75	.209E+0	

MOTOR OUTBOARD END > VERTICAL

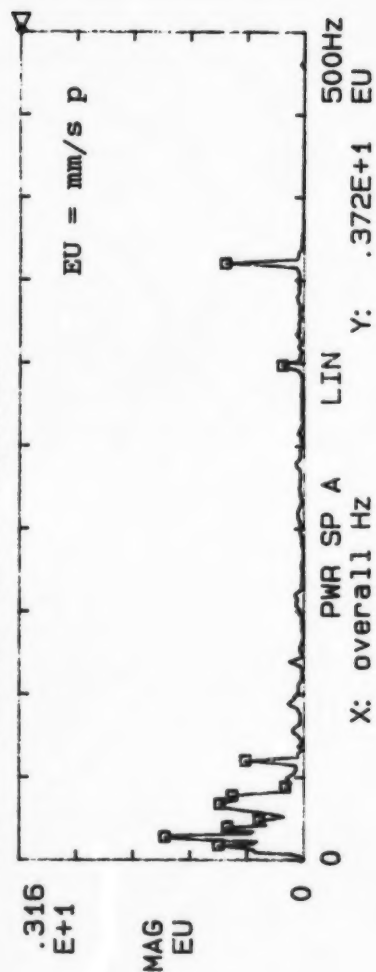


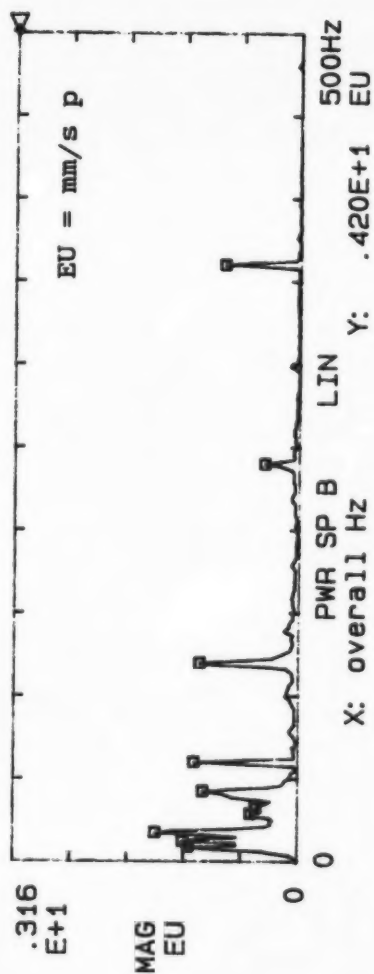
FIGURE C-19 : PUMPSET #1, VIBRATION SPECTRA, MOTOR OUTBOARD BEARING

04: 25

PICKERING A U1 SHUTDOWN COOLING PUMPSET #3 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB	
1	17.50Hz	.159E+1	EU
2	12.50	.128E+1	
3	8.75	.122E+1	
4	60.00	.117E+1	
5	120.00	.110E+1	
6	42.50	.107E+1	
7	360.00	.843E+0	
8	28.75	.528E+0	
9	32.50	.468E+0	
10	240.00	.389E+0	

MOTOR OUTBOARD END > N-S



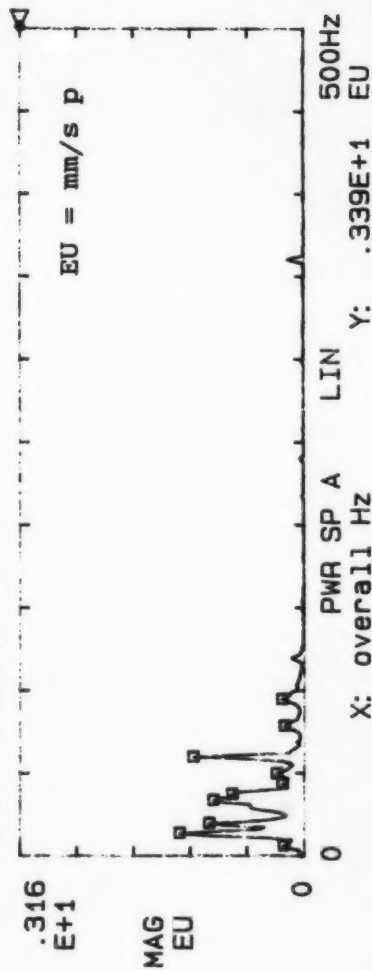
04:26

FIGURE C-20 : PUMPSET #1, VIBRATION SPECTRA, MOTOR OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #3 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	
1	13.75Hz	.139E+1	EU
2	60.00	.124E+1	
3	20.00	.106E+1	
4	33.75	.101E+1	
5	37.50	.807E+0	
6	50.00	.311E+0	
7	95.00	.251E+0	
8	43.75	.244E+0	
9	6.25	.237E+0	
10	78.75	.227E+0	

MOTOR OUTBOARD END > E-W



05: 18

FIGURE C-21 : PUMPSET #1, VIBRATION SPECTRA, MOTOR OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #3 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	EU
1	12.50Hz	.109E+1	EU
2	20.00	.696E+0	
3	60.00	.619E+0	
4	6.25	.447E+0	
5	8.75	.452E+0	
6	361.25	.405E+0	
7	377.50	.401E+0	
8	380.00	.364E+0	
9	28.75	.341E+0	
10	382.50	.336E+0	

PUMP INBOARD END > VERTICAL

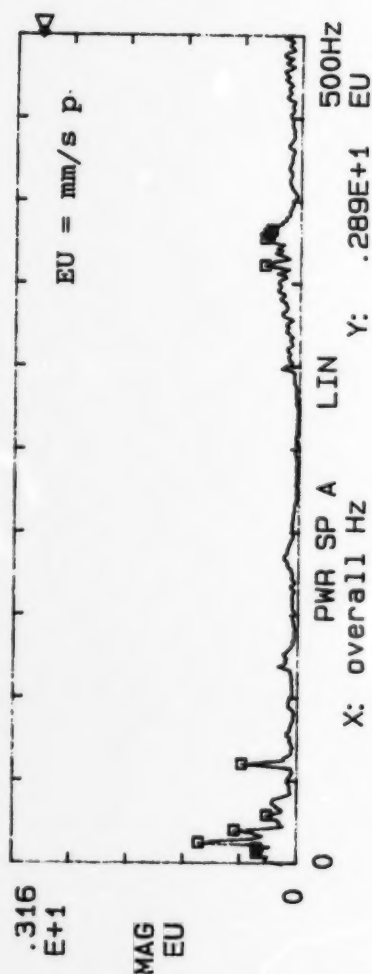


FIGURE C-22 : PUMPSET #1, VIBRATION SPECTRA, PUMP INBOARD BEARING

04:21

PICKERING A U1 SHUTDOWN COOLING PUMPSET #3 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	EU
1	60.00Hz	.120E+1	
2	12.50	.773E+0	
3	8.75	.716E+0	
4	18.75	.378E+0	
5	27.50	.292E+0	
6	23.75	.254E+0	
7	45.00	.171E+0	
8	38.75	.153E+0	
9	150.00	.111E+0	
10	68.75	.948E-1	

PUMP INBOARD END > N-S

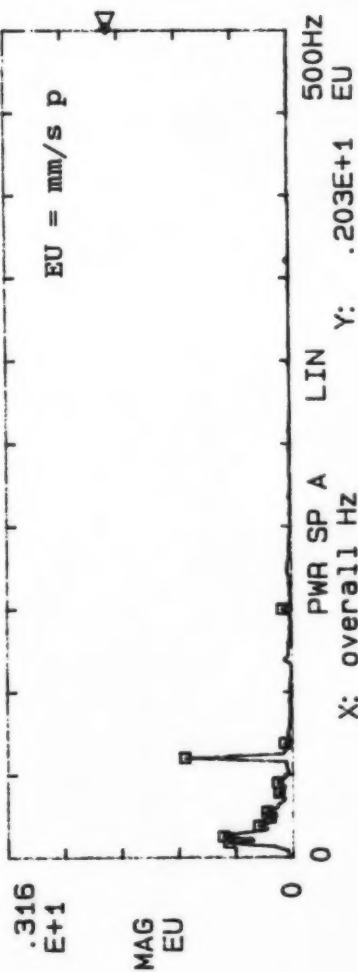


FIGURE C-23 : PUMPSET #1, VIBRATION SPECTRA, PUMP INBOARD BEARING

05:16

PICKERING A U1 SHUTDOWN COOLING PUMPSET #3 (EU-MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR	SPECTRUM	ChB
1	60.00Hz	.118E+1	EU
2	38.75	.663E+0	
3	13.75	.631E+0	
4	30.00	.367E+0	
5	17.50	.357E+0	
6	6.25	.297E+0	
7	8.75	.287E+0	
8	298.75	.171E+0	
9	65.00	.895E-1	
10	118.75	.803E-1	

PUMP INBOARD END > E-W

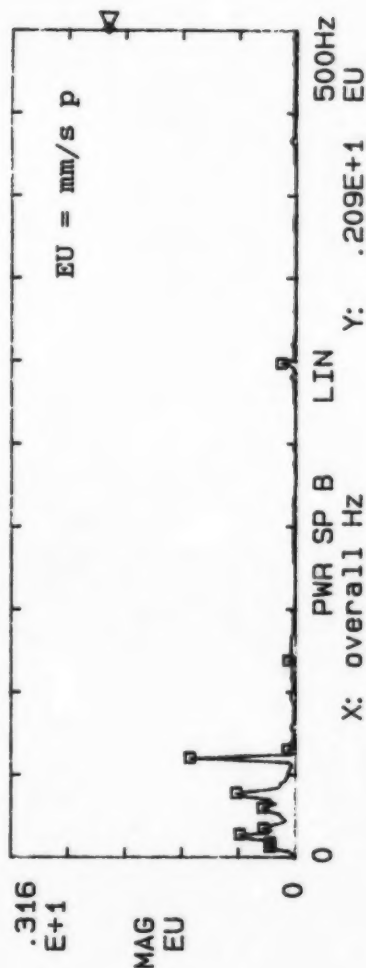


FIGURE C-24 : PUMPSET #1, VIBRATION SPECTRA, PUMP INBOARD BEARING

04:22

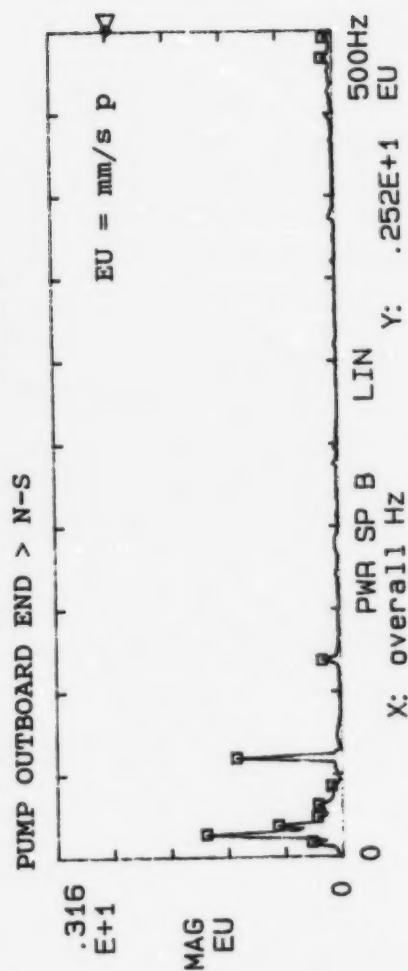
	PWR SPECTRUM	ChA	EU
1	13.75Hz	.152E+1	
2	20.00	.900E+0	
3	30.00	.860E+0	
4	60.00	.671E+0	
5	310.00	.484E+0	
6	38.75	.455E+0	
7	116.25	.407E+0	
8	120.00	.386E+0	
9	126.25	.367E+0	
10	247.50	.369E+0	



FIGURE C-25 : PUMPSET #1, VIBRATION SPECTRA, PUMP OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #3 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB	EU
1	13.75Hz	.152E+1	
2	60.00	.117E+1	
3	18.75	.717E+0	
4	8.75	.346E+0	
5	23.75	.278E+0	
6	31.25	.277E+0	
7	118.75	.216E+0	
8	483.75	.134E+0	
9	42.50	.127E+0	
10	496.25	.117E+0	

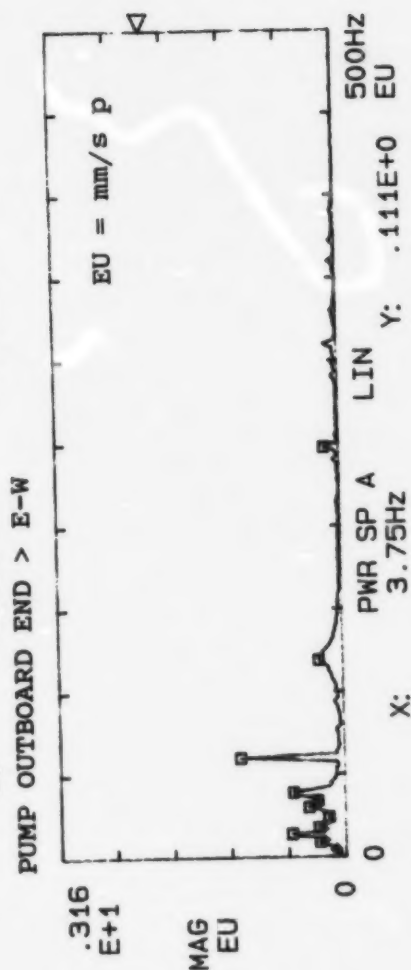


04: 22

FIGURE C-26 : PUMPSET #1, VIBRATION SPECTRA, PUMP OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #3 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	60.00Hz	.117E+1	EU
2	13.75	.599E+0	
3	38.75	.585E+0	
4	30.00	.411E+0	
5	33.75	.312E+0	
6	17.50	.301E+0	
7	8.75	.292E+0	
8	118.75	.271E+0	
9	23.75	.189E+0	
10	247.50	.173E+0	



04: 10

FIGURE C-27 : PUMPSET #1, VIBRATION SPECTRA, PUMP OUTBOARD BEARING

	PWR SPECTRUM	ChA	EU
1	13.75Hz	.134E+1	
2	8.75	.932E+0	
3	17.50	.913E+0	
4	6.25	.705E+0	
5	60.00	.650E+0	
6	240.00	.429E+0	
7	160.00	.309E+0	
8	25.00	.292E+0	
9	46.25	.254E+0	
10	30.00	.239E+0	

MOTOR OUTBOARD END > VERTICAL

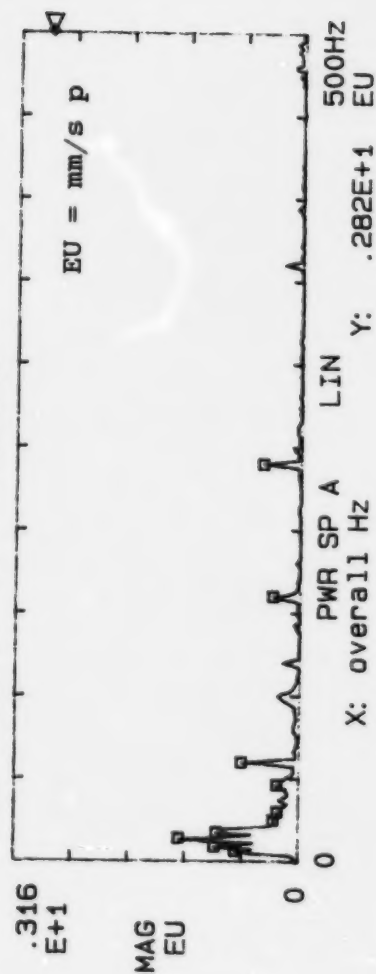
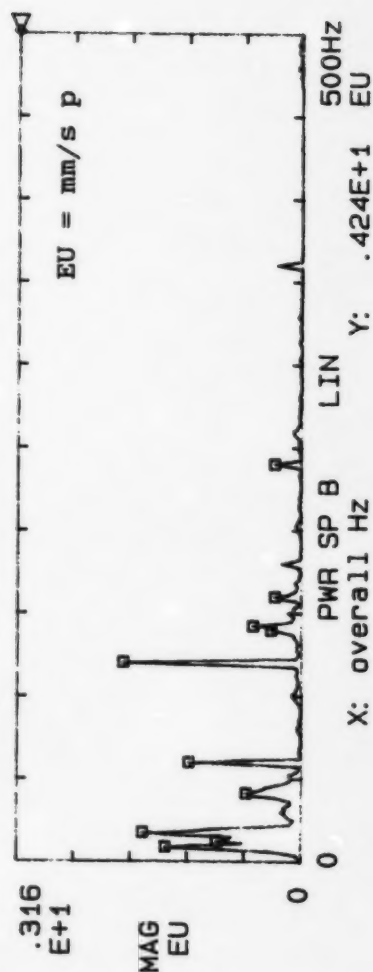


FIGURE C-28 : PUMPSET #1, VIBRATION SPECTRA, MOTOR OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #4 (EU=MM/S PK
500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChB
1	120.00Hz	.200E+1 EU
2	17.50	.177E+1
3	8.75	.152E+1
4	60.00	.126E+1
5	12.50	.946E+0
6	41.25	.619E+0
7	142.50	.547E+0
8	140.00	.337E+0
9	160.00	.299E+0
10	240.00	.304E+0

MOTOR OUTBOARD END > N-S



04: 10

FIGURE C-29: PUMPSET #1, VIBRATION SPECTRA, MOTOR OUTBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #4 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	13.75Hz	.128E+1	EU
2	60.00	.123E+1	
3	20.00	.976E+C	
4	100.00	.346E+0	
5	50.00	.299E+0	
6	46.25	.284E+0	
7	26.25	.201E+0	
8	6.25	.187E+0	
9	120.00	.186E+0	
10	33.75	.170E+0	

MOTOR OUTBOARD END > E-W

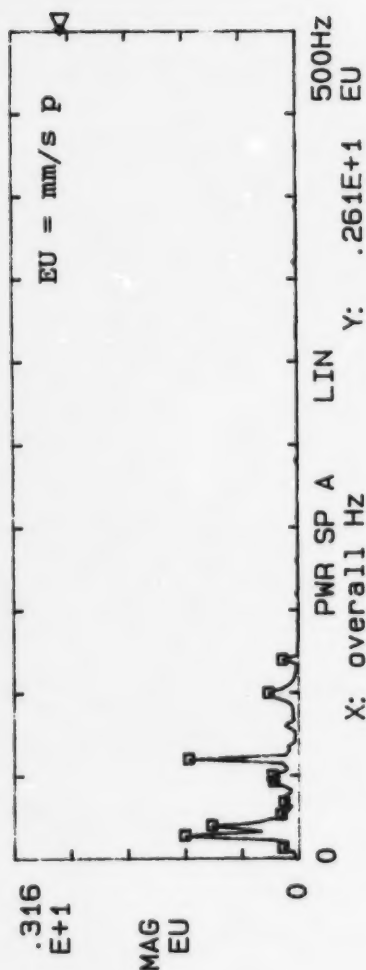


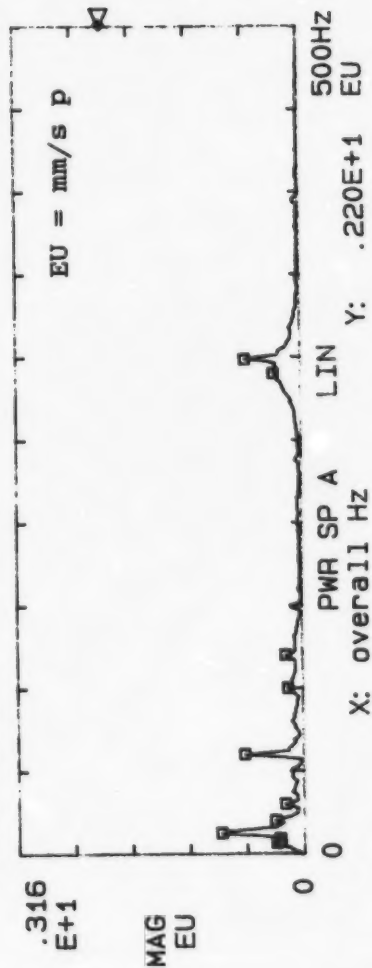
FIGURE C-30 : PUMPSET #1, VIBRATION SPECTRA, MOTOR OUTBOARD BEARING

00:14

PICKERING A U1 SHUTDOWN COOLING PUMPSET #4 (EU=MM/S PK
500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChA	EU
1	12.50Hz	.924E+0	EU
2	60.00	.658E+0	
3	298.75	.630E+0	
4	20.00	.318E+0	
5	6.25	.314E+0	
6	290.00	.309E+0	
7	8.75	.274E+0	
8	30.00	.211E+0	
9	120.00	.191E+0	
10	100.00	.169E+0	

PUMP INBOARD END > VERTICAL

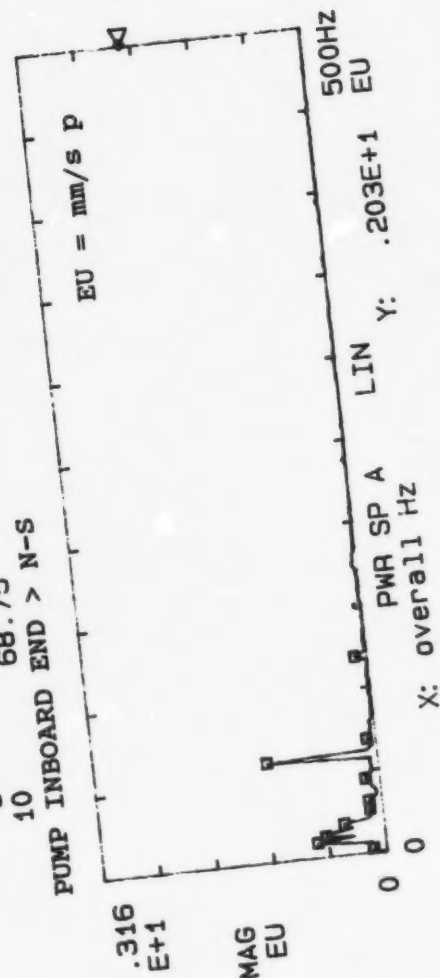


04: 06

FIGURE C-31 : PUMPSET #1, VIBRATION SPECTRA, PUMP INBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #4 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	EU
1	60.00Hz	.124E+1	
2	8.75	.771E+0	
3	12.50	.670E+0	
4	18.75	.449E+0	
5	45.00	.168E+0	
6	2.50	.149E+0	
7	26.25	.155E+0	
8	31.25	.151E+0	
9	118.75	.147E+0	
10	68.75	.105E+0	



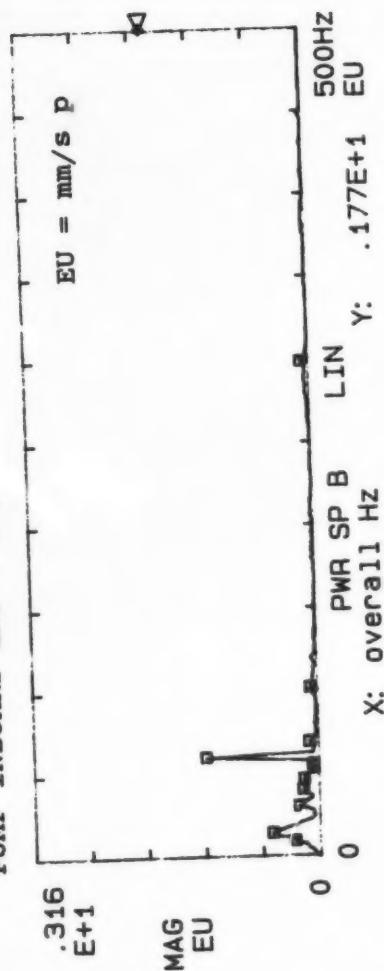
00:12

FIGURE C-32 : PUMPSET #1, VIBRATION SPECTRA, PUMP INBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #4 (EU=MM/S PK
500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1k

	PWR SPECTRUM	ChB	EU
1	60.00Hz	.125E+1	
2	13.75	.534E+0	
3	8.75	.284E+0	
4	30.00	.229E+0	
5	40.00	.179E+0	
6	46.25	.173E+0	
7	68.75	.106E+0	
8	298.75	.963E-1	
9	101.25	.817E-1	
10	55.00	.699E-1	

PUMP INBOARD END > E-W



04: 07

FIGURE C-33 : PUMPSET #1, VIBRATION SPECTRA, PUMP INBOARD BEARING

PICKERING A U1 SHUTDOWN COOLING PUMPSET #4 (EU=MM/S PK
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA	
1	13.75Hz	.124E+1	EU
2	360.00	.100E+1	
3	60.00	.662E+0	
4	20.00	.560E+0	
5	23.75	.397E+0	
6	373.75	.269E+0	
7	30.00	.238E+0	
8	368.75	.222E+0	
9	63.75	.192E+0	
10	50.00	.170E+0	

PUMP OUTBOARD END > VERTICAL

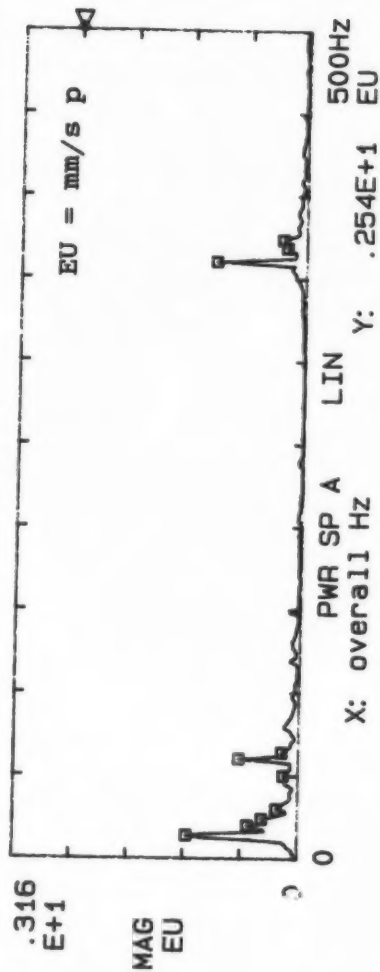


FIGURE C-34 : PUMPSET #1, VIBRATION SPECTRA, PUMP OUTBOARD BEARING

04:02

	PWR SPECTRAUM	ChB	EU
1	15.00Hz	.136E+1	
2	60.00	.126E+1	
3	18.75	.610E+0	
4	8.75	.445E+0	
5	26.25	.205E+0	
6	448.75	.173E+0	
7	30.00	.144E+0	
8	40.00	.138E+0	
9	118.75	.134E+0	
10	150.00	.102E+0	

PUMP OUTBOARD END > N-S

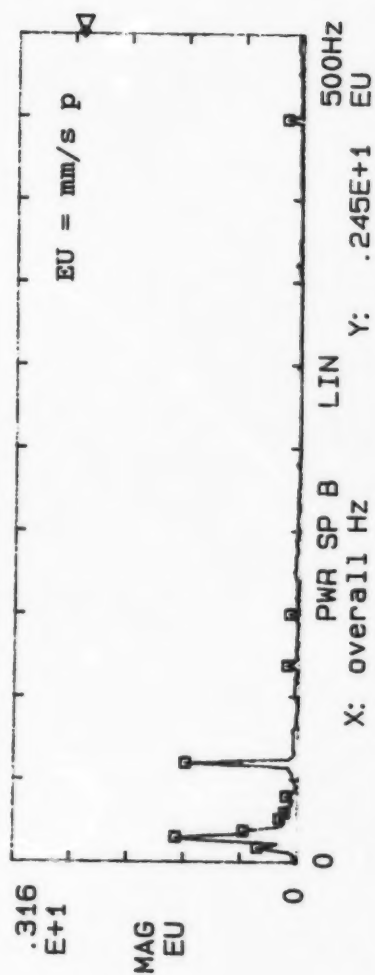


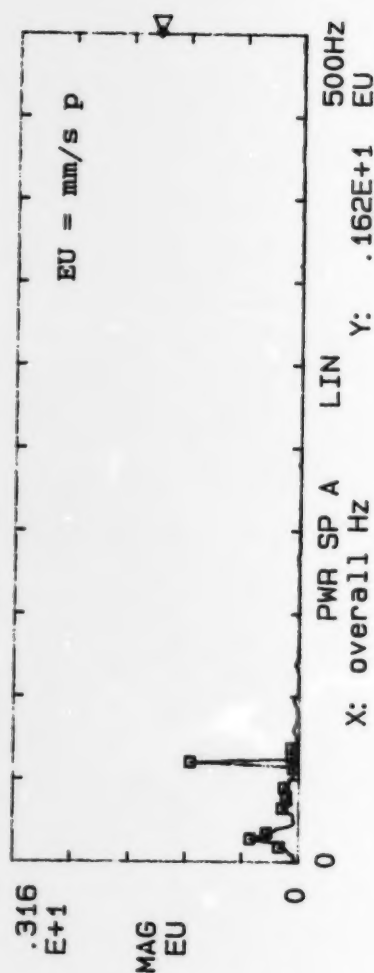
FIGURE C-35 : PUMPSET #1, VIBRATION SPECTRA, PUMP OUTBOARD BEARING

04:04

PICKERING A U1 SHUTDOWN COOLING PUMPSET #4 (EU=MM/S PK)
 500Hz A: AC/0.5V B: AC/0.5V S.SUM 64/64 DUAL 1K

	PWR SPECTRUM	ChA
1	60.00Hz	.122E+1 EU
2	13.75	.553E+0
3	17.50	.358E+0
4	8.75	.227E+0
5	32.50	.193E+0
6	45.00	.177E+0
7	40.00	.141E+0
8	63.75	.929E-1
9	68.75	.978E-1
10	56.25	.708E-1

PUMP OUTBOARD END > E-W



00: 10

FIGURE C-36 : PUMPSET #1, VIBRATION SPECTRA, PUMP OUTBOARD BEARING